The IRON AGE

March 31, 1960 A Chilton Publication The National Metalworking Weekly

Dake Corp.'s Jacobson and O'Dell—

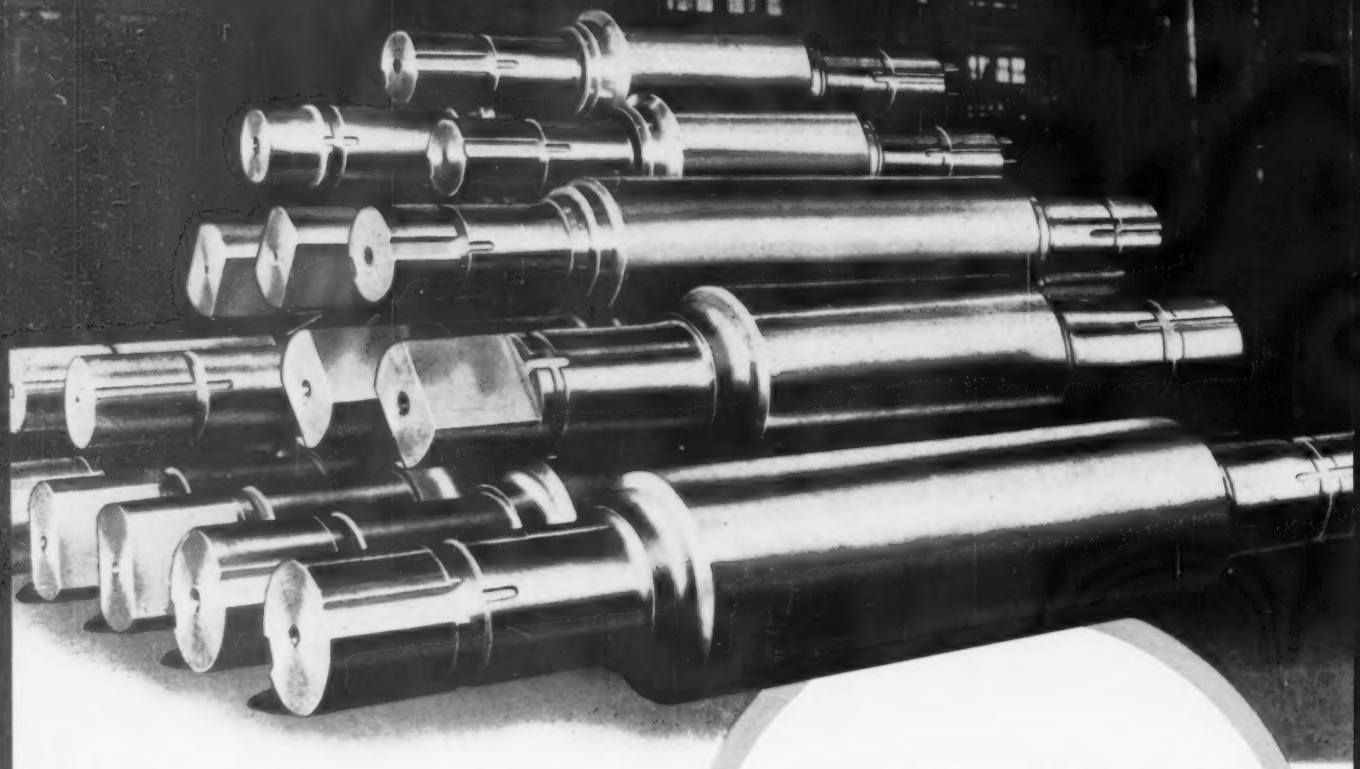
Advanced Methods Keep Nails Ahead of Import Threat P. 149

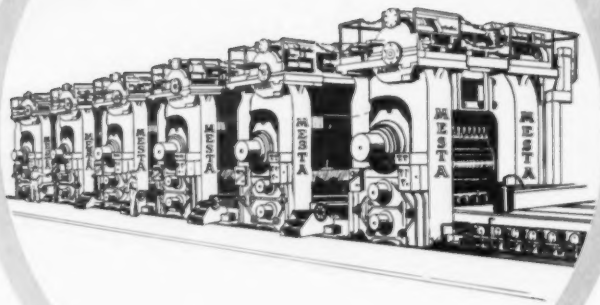
Does Castro Threaten U.S. Nickel Supply? – P. 109

Taxes: Big Element In Business Planning – P. 114

Digest of the Week – P. 2-3

MESTA ROLLS





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- Mesta "Duplex" Rolls
- Mesta Hardened Chill Rolls

Designers and Builders of Complete Steel Plants

MESTA MACHINE COMPANY

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Now Bethlehem forges it as shown—
and reduces manufacturing cost
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than the flat pancake forging did.
Our customer not only saves
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but almost all* the machining cost, too.
Perhaps we can do the same for you.
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*The only machining our customer does is finish the bore, and take light cuts on the outside tooth contour. Bethlehem can forge to the contour of sprocket teeth, if an as-forged surface is satisfactory.

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The IRON AGE

March 31, 1960—Vol. 185, No. 13

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News of the Industry

NICKEL SUPPLY

Cuban Story—Moa Bay operation has been suspended and Nicaro is uncertain under new Cuban mining laws. But a nickel supply pinch is unlikely in spite of threat to 100 million lb annual capacity. P. 109

IRON ORE IMPORTS

Foreign Ore Gains — American steel mills are growing more and more dependent on imported ores.

And one good source of ore is no longer enough for a major steel producer. Many companies are re-evaluating their raw materials situation. P. 112

TAXES AND PLANNING

Think Before Acting — Unless all the tax angles of a business decision are considered a profit may turn into a loss. Rockwell Manufacturing checks carefully before acting. P. 114

EQUIPMENT SALE

Tax Plan Dies—Treasury Dept.'s plan to revise tax on profits made

Metalworking

Cover Feature

NAIL AUTOMATION: Spurred by foreign competition, basic steel products, such as nails, are fighting to hold domestic markets. C. N. Jacobson and Gene O'Dell of Dake Corp. examine an automatic nail processing line. P. 149

from sale of depreciable items dies in committee. Any revision of depreciation laws will have to wait until 1961. P. 115

RADIO ENGINEERING

Getting Together—Radio engineering developments are closely relating it to the metalworking industry. Many new concepts can be used profitably. P. 117

Engineering-Production Developments

SIMPLE LOAD METERS

Control Manual Machining — Meters measure amperes drawn by motors on a hand-fed saw and a router. These meters establish control of working criteria. They also provide a means of maintaining optimum working conditions. Use of the meters allows all operators to produce identical results. P. 152

WELD GALVANIZED STEEL

Research Points Way—Welding of galvanized steel is often a problem. A recent study provides answers as to why cracking occurs and how it can be reduced. The best methods for reducing cracking appear to be: Substitution of lower penetrating electrodes and use of spacers in the faying plane. P. 154

NYLON PARTS

Machine or Mold?—Total output and complexity of a given design determine the method of making nylon parts. In general, machining handles short runs and symmetrical work. Injection molding suits volume output. As extruded volumes increase, unit costs drop. P. 158

MICROFILM SYSTEM

Speeds Engineering Data — Microfilms inside punch cards replace 620,000 mechanical and electrical prints. Carded data sent to world-wide locations include: complete specifications, drawings and standards for military items. P. 160

EXOTIC ALLOYS

Machining Problems — With waterbase coolants and advance planning, standard machine tools drill, mill and turn work-hardening alloys. Experience shows that high speeds and low feeds produce parts with little difficulty. P. 162

Market and Price Trends

H-IRON IN FARWEST

New Pilot Plant — Bethlehem expects its direct reduction pilot plant will be operating at Los Angeles late this year. The process converts iron ore into metallic iron pellets which can be used as electric furnace charge. P. 117

AUTOMOTIVE

World Market Grows — Before many more years pass the auto market in Europe may be bigger than the U. S. market. Other continents will help boost the world markets well above the U. S. total. P. 125

STANDARDIZED TOOLS

Are They Coming?—User group urges standardization of general purpose tools. It could aid users, help hold foreign markets, and aid defense, users contend. Builder reaction is still much in doubt. P. 133

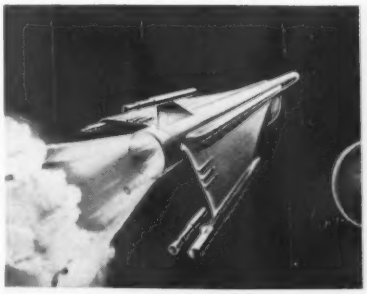
STEEL SUMMARY

Shakedown Continues — The market shakedown is not over. Rate of new orders is disappointing. A sharp drop in operations is coming unless a new wave of buying occurs. P. 205

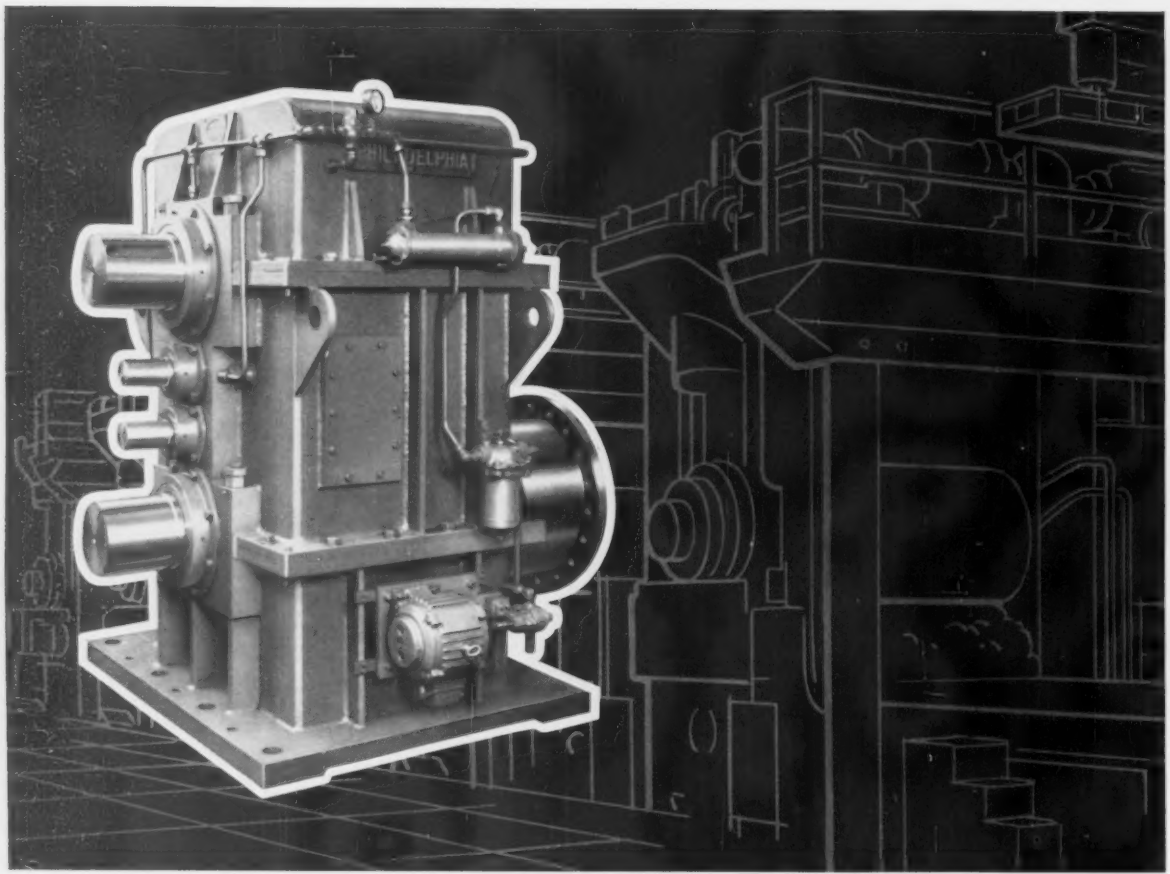
NEXT WEEK

AEROSPACE

How Big Will It Grow?—The space age is now only in its infancy —and it's already big business. Next week's special feature will look into the future of aerospace and whether it will continue its spectacular growth.



IMPROVED GEARS = { MORE POWER + LONGER LIFE }



This rolling mill pinion stand is a typical example of how Philadelphia Precision Ground Gearing is revolutionizing large mill drives.

Radically improved gear accuracies reduce dynamic load factors . . . gearing has increased load carrying capacity. Result: you can save space, increase speeds, transmit more power and get longer life. And in most instances, Philadelphia can furnish precision ground gear drives at no greater cost than conventional and special drives now being used.

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New switch for matchless safety

Now, for the first time, the new American Electric Type "ND" Safety Switch offers *all* of the features "most wanted" in *one* safety switch by people who work with and use electrical equipment.

Included among the many "extras" to be found in this newest of safety switches are: visible double blade construction; positive, snap-action make and break; double insulation between blades and operating mechanism; optimum-size enclosures for maximum heat dissipation; plenty of wiring space for easier, faster installation; and an exclusive safety-yellow operating handle for quick, positive "spotting" even in poor light.

These and countless other field-tested design standouts assure the ultimate in safety switch protection with maximum operating life.

This new American Electric Normal Duty Safety Switch is, in fact, the result of the same kind of thorough engineering research and workmanship which has long made Clark Controller *"the standard of quality"* for industrial electrical control.

It meets NEMA standards for normal duty industrial and commercial use and is approved by Underwriters' Laboratories for these applications as well as for service entrance equipment. It is currently available in 30-ampere and 60-ampere, 250-volt and 600-volt ratings, both fusible and non-fusible.

Bulletin 250-ND fully describes every detail of this new switch designed for "matchless safety". For your free copy see your nearest American Electric Switch–Clark Controller Company distributor. Or, write direct. 9851

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REUBEN SMITH, Inspector, MOTO-MOWER, Inc.
Subsidiary of DURA Corporation

"Here at Moto-Mower quality is not just a word . . . it's the goal," says Reuben Smith, Moto-Mower inspector. "To achieve this goal we have to be sure every component meets our rigid standards. I've found we can really depend on the quality cutting blade steels we get from the *Sharon Steel Corporation, Sharon, Pa.*"

SHARONSTEEL **SHARON** *Quality* **STEEL**

Portrait of a Leader: Let's Be Thinking About It!

Always we have followed a leader—when we had one. And we have been blessed because America has usually had good leaders.

But our future requires more than "good" leaders. In fact, we need better than "excellent."

If we do not garner a leader who will rally us to a new place in the world—and at home—we may go backwards. And this leader must inspire in us the simple confidence that Ike has done. If he doesn't, our job will get done, but it may be much harder to do.

While we look for our leader—who is in our midst—let's touch base on ourselves. No longer can we get away with mere repetition of our "stand" on thrift, Americanism, partnership, cooperation, togetherness, and other slogans. We have to ask, "Why?". We have to suggest something better if we tear down the other side.

Repeating what our Grandpappy said falls on deaf ears. It has for a long time, but many of us never knew it—even don't now. Most of those who have grown up in the past 30 years don't even know what some of us are talking about when we reach into the past for an argument, an idea, an alibi or a defense.

The old-time pitch that "papa knows best" went out years ago even if the papas do not know this by now. Most of us believe that papa does not know best—at least not all the time.

The old conservative labels mean much to those who use them but little to those who do not understand them. The new liberal labels don't reach many either, but they may sound better—if you don't ask the cost.

The "Americanization" of other nations will pose problems for us never dreamed of a few years ago. And we are not prepared to meet these unknowns.

The jump across hundreds of years by underprivileged nations will stun us as the years go on. Most of us cannot understand—or are not prepared for—the challenges and heartaches coming to those people—and to us.

Europe is in our backyard. Africa is across the street, South America is in our hair. And Russia and China are rapping on our friends' and neighbors' doors. And our own people are becoming jittery.

We have plenty to study. We have more to understand. We can't do much without a leader —who will lead us at home and abroad.

This man is away ahead of us. Find him!

Tom Campbell

Editor-in-Chief

PRODUCT INFORMATION

N/D sound booth for analysis of electric motor noise, mounted on springs and constructed with non-parallel walls, assures manufacturers a *scientific solution* to electric motor noise problems. Motors are tested with special electronic sound evaluation equipment.

How N/D Minimizes Electric Motor Noise!

In New Departure's full-time noise analysis program, a unique sound booth and special electronic sound level equipment are used to pinpoint and evaluate electric motor noise. Inside the booth, a condenser microphone picks up air-borne noise from the running motor. Outside, the signal is electronically registered and recorded.

By changing one variable at a time, such as bearing or mounting design, or lubricant, N/D engineers are able to select the proper combination that results in the quietest motor operation. That's why you'll find New Departure precision ball bearings specified for electric motors to be used in quality home appliances, instruments, fans, hand tools and other applications . . . for greater consumer sales appeal.

If you have an electric motor noise problem, contact the N/D Sales Engineer in your area. For additional information call or write New Departure Division, General Motors Corporation, Bristol, Connecticut.

NEW DEPARTURE

BALL BEARINGS

proved reliability you can build around

New Carbon Coating Process

Tests on carbon-coated steel samples, now under evaluation by electron tube makers, indicate that a new anode material has an emissivity equal to gas carbonized nickel-clad steel with one-half to one-third the gas content. The material is fired and formed in tests without any carbon flaking. Power dissipation appears similar to the widely-used Aliron anode-clad metal. Density is twice that of gas carbonized materials.

Make 17-4 PH More Ductile

Working closely with a major steel producer, WaiMet Alloys produces 17-4 PH stainless steel to revised specifications that make it a more reliable alloy for investment casting applications. Results from ten recent test heats indicate that minimum elongation is doubled. All elongation results fall in the 11- to 16-pct range.

Ground Support Equipment

From two-thirds to three-fourths of the total cost of a missile or space probe goes into ground support equipment. Pressure is now on to simplify this equipment—but new technical breakthroughs are needed. Meanwhile GSE grows and grows. Many metalworking firms are eyeing this booming field.

Coating Penetrates Pipe

A 14-mile section of 8-in. pipeline—with an experimental mill-applied coal-tar-epoxy-resin coating—has been installed underground. This pipeline is currently undergoing extensive tests. The Tarset coating is reported to actually penetrate the pipe while forming a strong bond.

Blast Furnace Yields Gears

Several Soviet metallurgical plants cast parts for their own machinery by using iron from the blast furnace—directly. They fill a 2-ton ladle from the standard 100-ton ladle. Then, they inoculate the smaller ladle with magnesium. The raw iron is of normal composition with low mechanical properties. After inoculation, the properties are greatly improved and are nearly equal to those of cupola-cast iron. Gears, piston rings and spouts are cast in this manner.

Missile Push Coming?

Pentagon planners are pushing for a big speedup in production of Atlas and Titan ballistic missiles. They want more of the big birds in a hurry. A speedup might boost costs from $100 to $400 million more than originally planned. Defense officials insist this country will have a massive retaliatory force of about 500 super missiles—ready in three or four years. Extra funds would make this total available sooner.

Measures Moisture in Sand

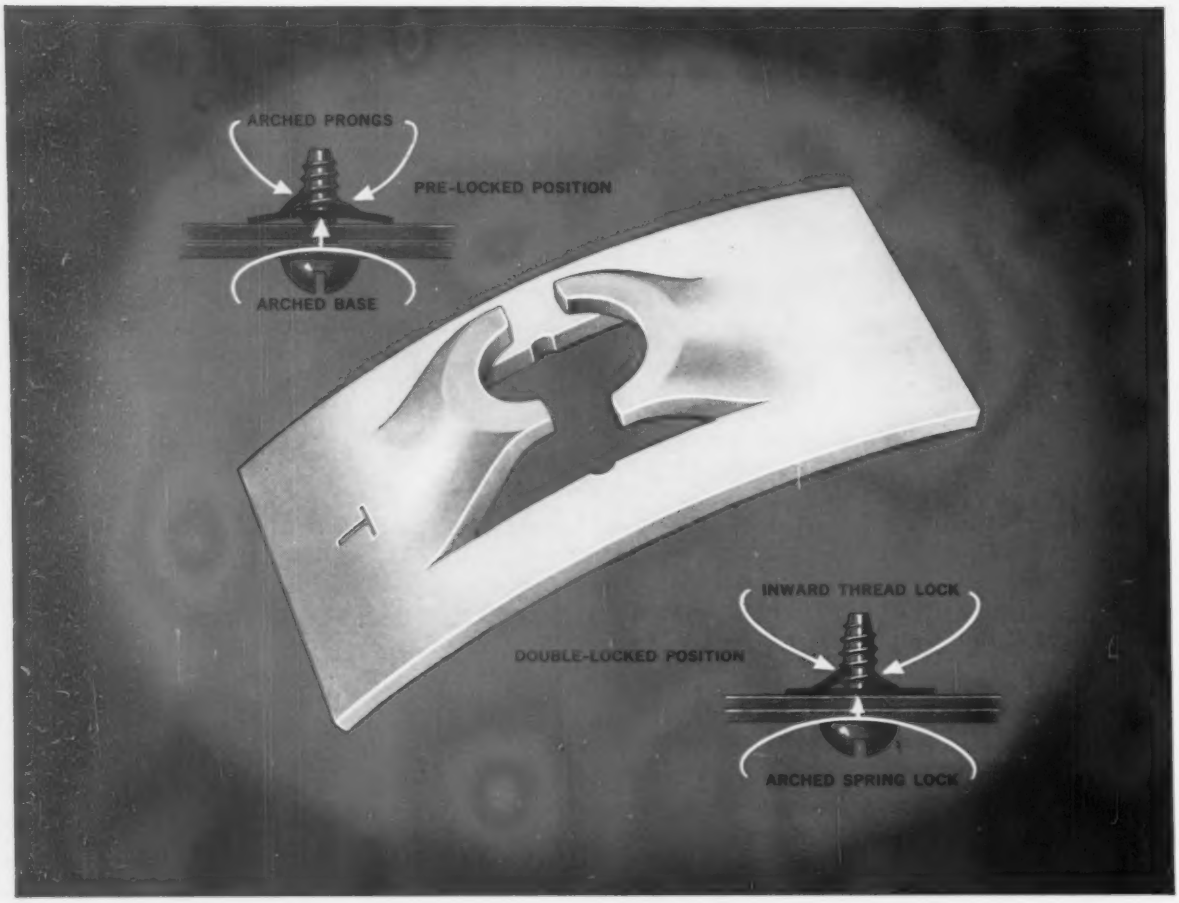
A small piece of man-made plutonium is doing an important job at General Motor's Central Foundry Div. Through gradual disintegration, it releases millions of alpha particles each minute of every day. This provides the key to a new nuclear moisture tester. The tester is reported to be the most accurate instrument yet developed for measuring the moisture of sand used in metal casting production.

China Exports Machine Tools

Over 20,000 metal-cutting machines have been imported by Red China. But, now the pendulum appears to be swinging the other way. A report from Russia states that Red China is currently exporting lathes, milling machines and shapers to countries in South-Western Asia and to African nations.

Stainless Steel Powder

Details aren't available yet, but a spokesman for a company in the field reports that stainless steel powder may be commerically available before very long. Supplies will be limited at first while production and marketing bugs are worked out. The new item is said to open the door to a number of new applications for stainless steel.



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Self-locking **SPEED NUT®** goes on fast, never shakes loose...and reduces costs!

With only one piece to handle, you can quickly position this Tinnerman Flat-Type SPEED NUT in screw-receiving position in one motion. No threaded nuts, no lock washers, no spanner washers to worry about.

Drive the screw and this spring-steel fastener locks tight, never to shake loose; yet easy to remove and reuse whenever you desire. SPEED NUTS won't freeze on screw threads!

Tinnerman Flat-Type SPEED NUTS are made in a full range of sizes, tensile strengths and corrosion-resistant finishes. Design variations also provide many multiple-function special types.

Lower cost per thousand plus lower cost of assembly give you maximum cost-reduction benefits... with maximum fastening assurance.

For more information, refer to your Sweet's Product Design File, section 7-Ti. Your Tinnerman representative has samples and prices. He's listed under "Fasteners" in the Yellow Pages. Or write to:

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New Ore Horizons

Only a year or two ago, when we thought of iron ore our thoughts were limited to the great open pits of the Mesabi and the giant hulks of Great Lakes ships moving through the Soo and down the Lakes.

But the ore horizons have widened a great distance in that time. This week, Tom Campbell, our editor-in-chief (and unofficial specialist in iron ore developments), gives an idea of how far.

This and More—If you will turn to p. 113, not passing up many other vital departments and stories, of course, you will read how dependent this country has become on foreign ores.

This year, for example, Tom has personally visited new developments from the tropics of Venezuela to the frozen north in Canada. And his coverage extends to Africa and other parts of the world.

The point he brings home is that U. S. mines each year supply less and less of the total ore consumed here. But he also points out the importance of new developments at home which will replace the once-rich ores of the Mesabi with beneficiated low-grade ore.

Moon Harvest

"My Sweetheart's the Man in the Moon," or so goes the title of an old song. But right now the U. S. is in a race with Russia to land a man on the moon. If their man gets there first, a lot of ladies are going to have to strike an old boyfriend from the list. He may continue to look the same at a distance of 240,000 miles, but they will know he isn't the same fellow they used to know.

A Look-See—Lately, one of our editors has been delving into the moon—and beyond. In fact, he's been looking into the whole aerospace field. And the further he looks, the more limitless it appears. Like the present theories about the universe, its continually expanding.

How big is the aerospace field? And how big will it be in the future? What are we doing in our space program? What do we hope to accomplish in space?

Unfortunately, we can't get our editor out of orbit to find out if he has the answers to these questions. But we're betting he'll have most of them for next week's issue.

Mailbag

In the Dec. 24, 1959, issue, we ran an item telling of a new book, published by the Dept. of Commerce, on inventions wanted by the armed forces.

A short time later we talked with the department and learned they were flooded with requests. And they sent us a letter telling how pleased they were.

And More—Well, we published the letter in our "Letters From Readers" column. Now we find that people are sending the letter to the Dept. of Commerce for a copy of the booklet.

This proves two things: People read all of The IRON AGE; and there are a lot of potential inventors around.

"Yes sir, Jones. A pay raise, a promotion and an extra two-weeks vacation, all yours."

STRAITS TIN REPORT

News of developments in the production and uses of tin

MALAYAN TIN BUREAU

Automatically soldered printed circuits are substituted for a maze of wires and relays in the instrument panel of the 1960 Mercury. This is another example of the use of tin-lead solder to help reduce electrical failure and simplify service.

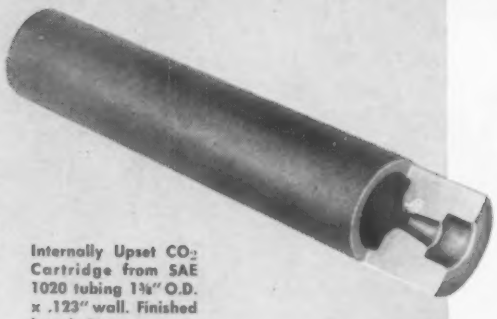
Tin cuts bacteria 80% on hospital floors—according to Columbia University research on the organotin compound tributyltin oxide (TBTO). Certain other compounds from nontoxic tin salts can become powerful biocidals, rivaling DDT as insecticides. Tanners use them as disinfectants; paper mills as slimicides and antimold-growth agents in water systems.

Tin replaces chromium as a coating for trumpet valves and trombone slides. The antifriction alloy of tin and nickel has a high degree of lubricity, reduces excessive wear.

Architects are rediscovering the tin roof . . . century-old terne roofing is making a comeback as an economical, corrosion-resistant and fireproof covering. Terne, tinplated steel sheets, offers permanent protection. Lighter than other metal roofing, it ends need for special load-bearing substructures. Tensile strength is high; no cracking or creeping with climate changes.

Write today for more data on these items or for a free subscription to TIN NEWS—a monthly bulletin on tin supply, prices and new uses.

The Malayan Tin Bureau
Dept. 54C, 2000 K Street, N.W., Washington 6, D.C.



Internally Upset CO_2 Cartridge from SAE 1020 tubing 1⅜" O.D. x .123" wall. Finished length 7".

Advanced upset technique saved O.E.M. 25%..."Task-Forging" formed neck 4 times wall thickness in 1 pass (Conventional practice requires 4 passes)

- Customer now buys only 1 part—machining and assembly of insert eliminated
- Strength of pressure vessel increased by 1-piece design
- 18% reduction in scrap—customer trim at sealed end eliminated

OBJECTIVE: How to increase your profit margin
METHOD: By ingenious upsetting of unusual parts

Externally Upset Barrel Blank from SAE 1020 tubing 3⅛" O.D. x $^{13}/_{32}$" wall. Forged length 10.062". Forged tolerances to $\pm\frac{1}{32}$".

Flanges and boss upset on "Task-Forged" tube...machining reduced 33%, metal 15%

- Now 1 piece instead of 4—originally a weldment of 2 flanges, a boss and a tube
- Greater strength—toughness portioned where needed
- More accurate than mill tolerance of tubing

Some call it ingenuity. At COMMERCIAL it's the basic philosophy for keeping a long step ahead of competition.

Very simply...our customers are in business to show a profit; we contribute by delivering unusual upset forged components at a better cost—the result of complete design analysis and 35 years of continually perfecting new upsetting techniques that go far beyond conventional limits.

COMMERCIAL's "Task-Forging" team of engineers are experts in establishing the production techniques and die design patterns for extraordinary upset requirements ...particularly heavy forgings involving the internal, external and pierced displacement of metal.

Behind them is the versatile modern COMMERCIAL plant which produces uniformly sound, metal quality upset forgings which are performance-tested and very often include design improvement for the customer's benefit. Facilities include upsetters from 1½" through 8"...threading equipment handling up to 6½" diameter stock, and rough or semi-finished machining.

These unusual forgings typify customer benefits which resulted from a little ingenuity and a lot of "know-how" as applied by this "Task-Forging" team of experts. It is just possible that they can discover hidden profits in your component parts. No obligation. Address: Commercial Shearing & Stamping Co., Dept. K-11, Youngstown 1, Ohio.

COMMERCIAL
shearing & stamping

Gaging Steel

Sir—We have read with great interest the information given by you in your February 18 issue on page 9 regarding "a new recorder gages steel."

Could you possibly let us have further data on this new device and eventually the name of the companies by whom it is used.—R. Colmant, Societe Lorraine de Laminage Continu, Paris, France.

Write to Mr. Art Warmeskerten, Public Relations, Great Lakes Steel Corp., Ecorse, Mich.—Ed.

Infra-Red Film

Sir—In the February 18 issue of The IRON AGE there is an item referring to the use of infra-red film.

I would like any information on this that you can give me or any reference to articles on this subject, if you have any available.—C. Goodman, Engineering Division, Ferro Corp., Cleveland.

Sir—We would appreciate receiving additional information on the use of infra-red film for use in checking heat loss. The data available from film manufacturers of infra-red film describes the use of infra-red film, but does not specifically cover the applications you have mentioned. Any information you have would be of great value since we have attempted experiments along the same line.—G. A. Ratz, Research Metallurgist, United States Steel Corp., Duquesne, Pa.

Write to the Eastman-Kodak, 343 State St., Rochester 4, N. Y. —Ed.

Automation

Sir—On page 9 of the February 25 issue of The IRON AGE there is a one paragraph item headed "Automation Feeds Grinders."

This indicates that there is an automated scheduling which handles a mix for a family of related parts. We would be very much interested in any information you can supply about this application. Would you please advise as to how this information can be obtained.—R. N. Cambridge, General Engineering Department, Union Carbide Consumer Products Co., Div. of Union Carbide Corp., Rocky River, Ohio.

Write to Mr. D. A. Cargill, Pres., Cargill-Detroit Corp., 1250 Crooks Rd., Clawson, Mich.—Ed.

Trade-Mark

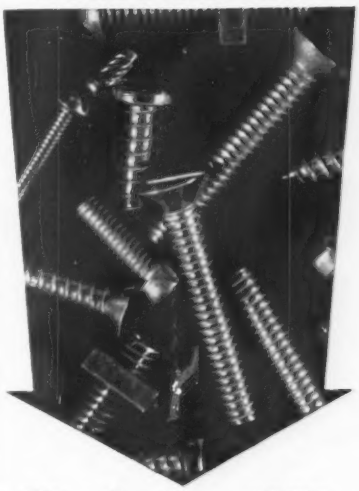
Sir—Our company, Illinois Tool Works, of Chicago, Ill., is the owner of registered trade-mark number 555,017, covering the trade-mark "KEPS" as applied to pre-assembled nuts and washers.

In your February 25 issue, page 25, the trade-mark "KEPS has been used improperly and applied as a generic term, relating to nuts or in connection with the advertising of products of other manufacturers.—R. W. Beart, Vice Pres., Illinois Tool Works, Chicago.

We're glad to set the trade-mark straight.—Ed.

"I'd suggest you come in here for a minute."

For Finest Plated
finishes



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Here's why it pays to buy all your plate fasteners from Southern Screw. Southern makes its own fasteners from finest material available. Our stock exceeds 1,500,000,000 pieces — all USA-made.

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Whether your requirements for plated fasteners are large or small, write for Southern Screw's current Stock List, requesting information about the items and finishes you need. Address Southern Screw Company, P. O. Box 1360, Statesville, N. C.

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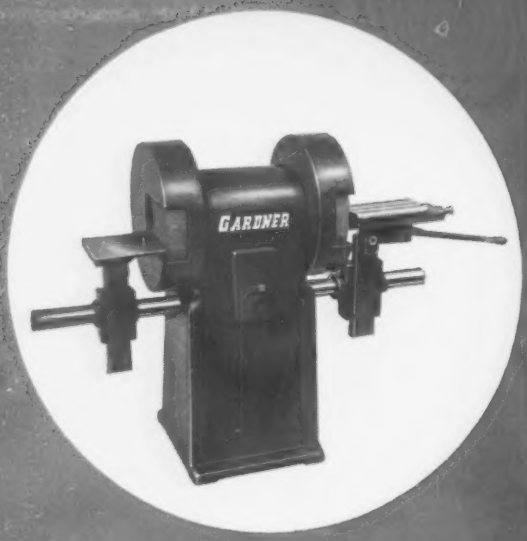
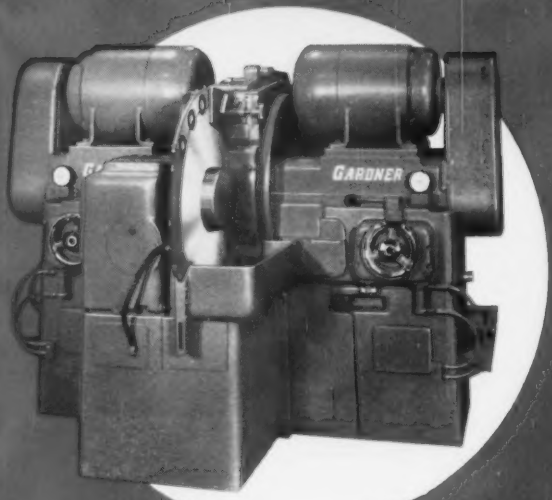
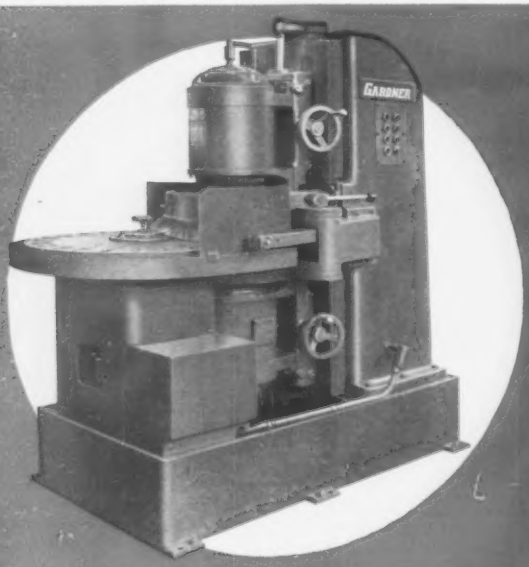




Single Spindle Disc Grinders—For production grinding single surfaces. Manual and power-operated work-carrying fixtures available.

Precision Double Spindle Disc Grinders — Grind TWO parallel surfaces in ONE operation. Rotary, feed thru or gun type work fixturing.



Precision Vertical Double Spindle Disc Grinders— Grind TWO parallel surfaces in ONE operation. Springs and miscellaneous small parts for watches, business machines, electronic applications . . . metallic and non-metallic materials.

Special Purpose Disc Grinders—For parallel surfaces, sequence grinding, generating curved surfaces . . . single or multiple surfaces.

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For information send for Condensed General Catalog

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COMING EXHIBITS

Tool Show—April 21-28, Detroit Artillery Armory, Detroit. (American Society of Tool Engineers, 10700 Puritan, Detroit 38.)

Powder Metallurgy Show — April 25-27, Drake Hotel, Chicago. (Metal Powder Industries Federation, 60 E. 42nd St., New York.)

Welding Show—April 25-29, Great Western Exhibit Center, Los Angeles. (American Welding Society, Inc., 33 West 39th St., New York 18.)

1960 Castings Congress & Exposition—May 9-13, Convention Hall, Philadelphia. (American Foundrymen's Society, Golf & Wolf Rds., Des Plaines, Ill.)

Southwestern Metal Show — May 9-13, State Fair Park, Automobile Bldg., Dallas, Texas. (American Society for Metals, Metals Park, Novelty, O.)

Design Engineering Show — May 23-26, Coliseum, New York. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17.)

Production Engineering Show — Sept. 6-16, Navy Pier, Chicago. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17.)

Machine Tool Exposition—Sept. 6-16, International Amphitheatre, Chicago. (National Machine Tool Builders Assn., 2139 Wisconsin Ave., Washington 7, D. C.)

Iron & Steel Show—Sept. 27-30, Cleveland Public Auditorium, Cleveland, O. (Association of Iron & Steel Engineers, 1010 Empire Bldg., Pittsburgh 22.)

MEETINGS

APRIL

The Metallurgical Society of AIME—Nuclear Congress, April 3-8, The Coliseum, New York. Society headquarters, 29 West 39th St., New York.

(Continued on P. 16)

"Call FOSTER... they'll ship Switch Material PLUS"

Right! L. B. Foster Company will ship switch material "*plus*" any standard rail section (new or relaying), crane rail and accessories, and track tools —everything you need, at lowest possible costs. Foster is your fastest, most dependable source for every rail and track item required for industrial sidings or in-plant trackage.

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PIPE • PILING • RAIL

Discharge Valve

SWITCH FROM SAND CASTINGS TO BRASS FORGED PARTS

Here's why! Your component parts forged of Titan brass will outperform any you now buy as sand castings. No more costly rejects due to blow holes and sand inclusions. Eliminate leakage and other product failures. The twice-wrought metal in brass forgings has the inner toughness and density to give you new strength and workability. Thinner sections can be used.

Tensile strength is almost double that of most sand castings. Closer tolerances, dimensional uniformity of production lots, and superior finish unknown in sand castings are routine in Titan forgings. For you this means faster chucking and better machinability—threads can often be chased on the forging without preliminary forming. And you have less scrap and less finishing cost prior to plating.

In a Titan forged part you get greater eye appeal to help sell your product. Look at the smooth surface of these forgings to see what we mean; each was once a rough sand-cast part.

May we say more? Call your nearest Titan office for detailed information and a brass forging quote on your sand-cast parts.

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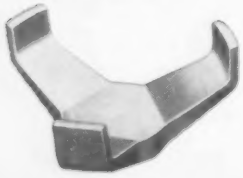
Main Valve Control

Heat Exchanger Head

Gauge Socket

Air Compressor Part



Storm Door Handle

Main Valve Seat

Lavatory Pop-up Plug

MEETINGS

(Continued from P. 15)

The Metallurgical Society of AIME — National Open Hearth Steel Conference & Blast Furnace, Coke Oven, & Raw Material Conference, April 4-6, Palmer House, Chicago. Society headquarters, 29 West 39th St., New York.

National Metal Trades Assn. — New England congress meeting, April 5, Sheraton-Plaza Hotel, Boston. Association headquarters, 337 W. Madison St., Chicago.

Lead Industries Assn. & American Zinc Institute—Joint annual meeting, April 6-8, Park Plaza Hotel, St. Louis. Association and Institute headquarters, 60 E. 42nd St., New York.

Steel Shipping Containers Institute, Inc.—Annual meeting, Apr. 12-14, The Breakers, Palm Beach, Fla. Institute headquarters, 600 Fifth Ave., New York 20, N. Y.

American Machine Tool Distributors Assn.—Spring meeting, Apr. 18-20, The Greenbrier, White Sulpher Springs, W. Va. Association headquarters, 1500 Massachusetts Ave., N. W., Washington 5, D. C.

American Society of Lubrication Engineers—Annual meeting, April 19-21, Netherland-Hilton, Cincinnati. Society headquarters, 5 North Wabash Ave., Chicago.

National Assn. of Sheet Metal Distributors — Spring meeting, April 20-22, Deshler Hilton Hotel, Columbus. Association headquarters, 1900 Arch St., Philadelphia.

Rail Steel Bar Assn. — Annual meeting, April 20-22, Palm Beach Biltmore Hotel, Palm Beach, Fla. Association headquarters, 38 S. Dearborn St., Chicago.

Metal Powder Industries Federation—Annual meeting, April 25-27, Drake Hotel, Chicago. Headquarters, 60 E. 42nd St., New York.

New Model H-120 Hough "PAYLOADER" built to scoop 20% more load because of the great strength of USS MAN-TEN and "T-1" Steels.

USS "T-1" and MAN-TEN Steels cut 1 ton of dead weight from this bigger PAYLOADER®

Two thousand pounds of weight have been chopped from the front end of this new Hough H-120 "PAYLOADER" by designing with USS "T-1" and USS High-Strength Steels. Result: one ton more capacity . . . increased reach and dumping height . . . better balance . . . stronger construction . . . lower operating costs.

This is another case where the greater tensile properties of the high-strength steels and the *extra* high strength of USS "T-1" Steel (100,000 psi minimum yield strength) made possible a superior designed machine. About 4,000 pounds of USS "T-1" Constructional Alloy Steel in ½" and ¾" plate and ½" x 5" bars are used in the boom arms, rocker arms, and bucket attachment brackets. The bucket is 5/16" USS MAN-TEN Brand High-Strength Steel—a 50,000 psi minimum yield point grade.

The bucket lift assembly was designed to a working stress, which, multiplied by a reasonable safety factor, comes up to the full minimum yield strength of "T-1" Steel. The 2,000 pounds of weight saved went directly into increased payload capacity—20%. The new "PAYLOADER" can handle 12,000 pounds instead of the 10,000 pounds of the experimental design. This is just what the customers wanted. No other steel offered such a high ratio of strength to weight.

The first 150 of these Hough tractor shovels are already giving outstanding service. More are being built. The combination of USS "T-1" and MAN-TEN Steels in the new "PAYLOADER" provides high strength with low total cost, lighter weight and freedom from maintenance.

For more information on any of these USS special steels, write to United States Steel, Room 2801, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

The Frank G. Hough Co. is a subsidiary of International Harvester Co.

USS, "T-1" and MAN-TEN are registered trademarks of United States Steel. "PAYLOADER" is a registered trademark of The Frank G. Hough Co.

United States Steel Corporation – Pittsburgh
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This is a space ship floor maker

Sometime within the next several years, the first American will soar into orbit around the earth. He will be sealed in a small, cone-shaped space capsule mounted atop an Atlas missile. The missile will climb 100 miles in less than six minutes, where the capsule will disengage and go into orbit. The man will be alone in space.

The vehicle for this historic voyage is already in production, under the auspices of the National Aeronautics and Space Administration's "Project Mercury." One of the possible methods of heat protection is a beryllium heat sink, forged on two giant steel dies. Both dies are USS Quality Steel Forgings. The top die (shown being rough-machined on one of our vertical boring mills) will be convex, 20 inches thick and will weigh 26,520 pounds. The bottom die, concave and 18 inches thick, weighs 27,700 pounds. Both are 92 inches in diameter.

The heat sink of the space capsule will also be its leading face when re-entering the atmosphere. It will be traveling 18,000 miles per hour, subject to thousands of degrees of temperature and many times the force of gravity. Naturally, it has to have superb strength and heat-resistant characteristics. By the same token, the dies that shaped the capsule floor had to be perfect.

After forging, both dies were subjected to preliminary heat treating and preliminary machining. Then came quenching and tempering. A battery of tests followed: ultrasonic inspection, tangential tensile tests, Charpy V notch impact tests, grain size tests, bend tests and magnetic particle inspection. Only then were the dies ready to take the incredible forging pressure, exerted by the giant hydraulic closed-die forging press where the beryllium disc was formed.

We invite your inquiries or requests for our free 32-page booklet on USS Quality Forgings. Just write United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

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Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
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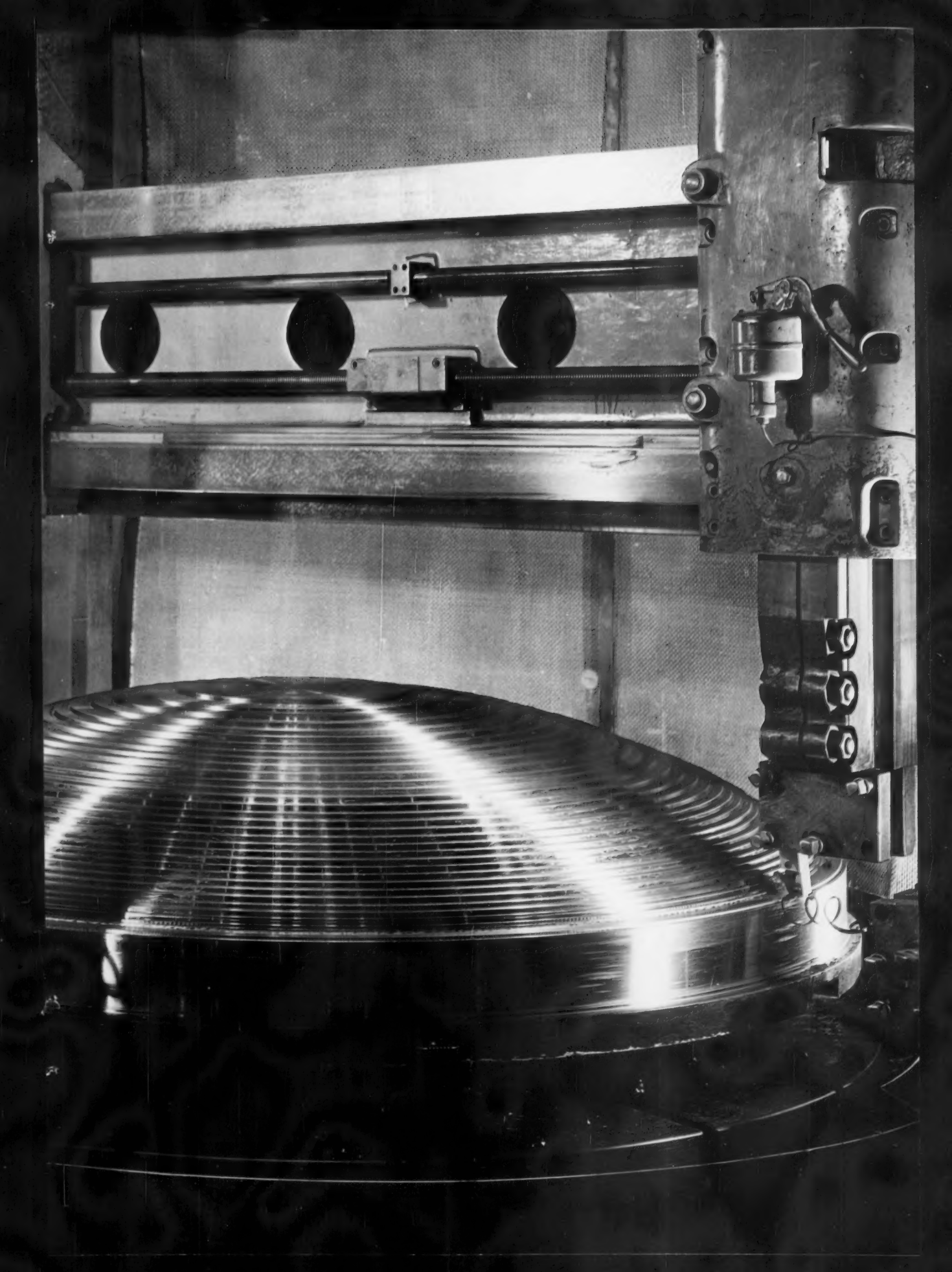
USS



Wood proves Stainless Steel is simple to fabricate

General Sales Manager, C. Paul Carlson, points to the Stainless Steel milk cans designed and manufactured by the John Wood Company.

There's probably no one that has more experience and know-how with Stainless Steel fabrication than the John Wood Company. At eight different plants in the U. S. and Canada, the company makes everything from gasoline pumps to milk strainers. At their St. Paul plant they are equipped to produce 50% of the Stainless Steel can requirements for the entire dairy and dispenser industries.

The company worked closely with sanitation experts and health officials to design a Stainless Steel can that meets the strictest regulations for both material and workmanship. And at the same time, they found ways to simplify fabrication and save time and materials. They developed methods of hydraulic forming, welding, grinding and polishing that have paid off in lower costs and a quality product. These Stainless cans have a hard, durable finish that is easy to clean, ready for long, sanitary service. The John Wood Company proved that Stainless Steel isn't difficult to fabricate, it's just different.

If *you* would like to have complete information about working with Stainless Steel, write for a free copy of our *Stainless Steel Fabrication Book*. United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS is a registered trademark

USS

United States Steel Corporation—Pittsburgh
American Steel & Wire—Cleveland
National Tube—Pittsburgh
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United States Steel Supply—Steel Service Centers
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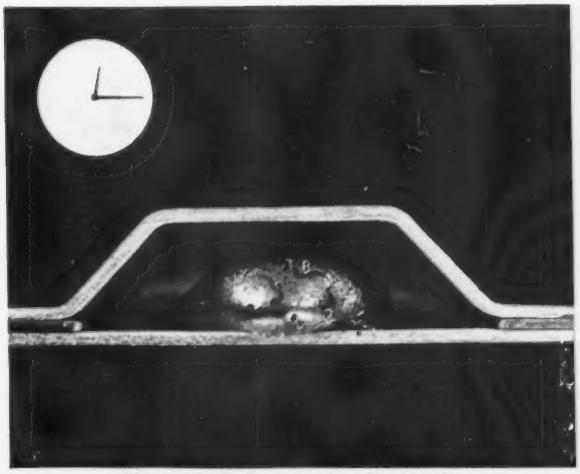
United States Steel

Positive way to seal irregular gaps and seams—3M Heat Expandable Sealers

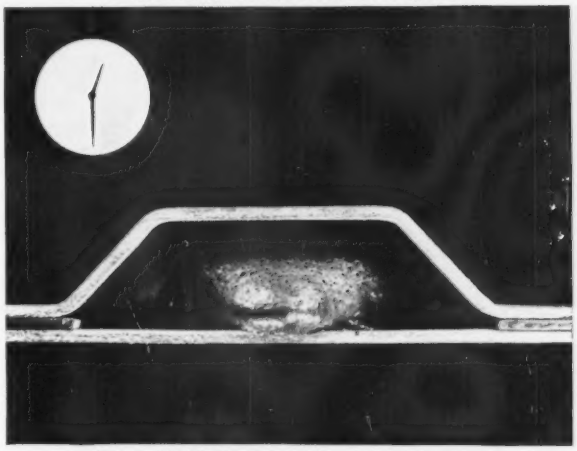
You can simplify tough sealing jobs of irregular gaps and seams with 3M Heat Expandable Sealer EC-1817-A. When heated this liquid will expand 150% in volume and cure to a solid sponge rubber material to tightly fit the shape of the seam, affording a weather-tight, water-tight, dirt-tight seal.

EC-1817-A is designed to expand and cure to a resilient sponge-like rubber which will adhere to most surfaces. It can also function as a weld-thru sealer which does not alter normal spot welding procedure, nor interfere with weld quality. EC-1817-A adheres well to both clean and oily surfaces. Use it wherever irregular openings must be filled, or where seam width is not constant.

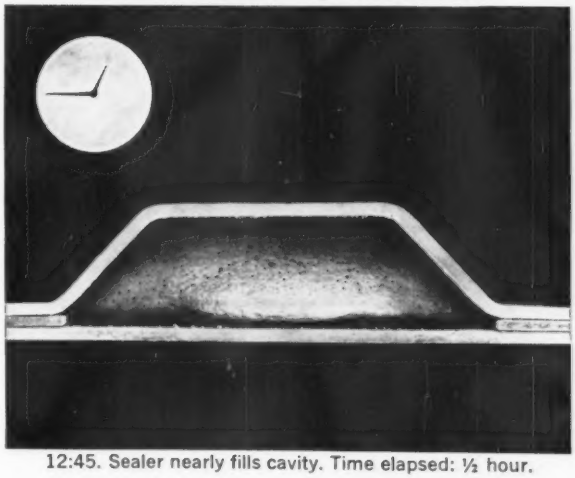
Let 3M Adhesives, Coatings and Sealers help speed your production, improve product quality. For free information, write on your company letterhead to: AC&S Division, 3M Company, Dept. SBQ-30, St. Paul 6, Minnesota.



Time: 12:15. Sealer enters heat cycle.



Time: 12:30. Sealer nearly doubled in size.



12:45. Sealer nearly fills cavity. Time elapsed: ½ hour.

ADHESIVES, COATINGS AND SEALERS DIVISION

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3M COMPANY

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A dual purpose Gulfcut oil has enabled General Electric to achieve significant operating economies without sacrifice of machine speed or performance.

Gulfcut 41B—a sulfo-chlorinated-lard oil—is used by G.E. as the cutting fluid in their Conomatic bar machines, for machining four different sizes of motor shafts. Turned from C1212 steel at a spindle speed of 112 rpm, these motor shafts must be held to close tolerances to meet the company's high standards of product quality. G.E. reports that with Gulfcut oil they not only maintain exacting tolerances, but also get fine finishes and longer tool life.

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Whatever the type of machining you do, there's an oil in the complete Gulfcut line to meet your every need. Call a Gulf Sales Engineer at your nearest Gulf office, or send for your free copy of "Metal Machining with Cutting Fluids," 116 pages on their selection and use.

Gulfcut oil enables 8-spindle Conomatics at General Electric, Linton, Indiana, to cut motor shafts to fine tolerances; helps give them precision finishes.

Carl B. Beyerlein (right), supervisor of planning, G.E., Linton, Indiana, discusses machining problems with M. S. Ringo, Gulf Sales Engineer.

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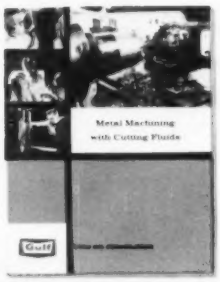

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NOW... prompt delivery from mill stocks!

Stainless Heat Exchanger Tubes

Save time in getting Types 304 and 316 heat exchanger tubes for new units or re-tubing jobs. Call your nearest Carpenter office for prompt delivery from large mill stocks of sizes ⅝" to 1" O.D. in 18 and 16 BWG. Stock lengths up to 40 feet are cut to your specific requirements. These full-finished tubes fully meet ASTM Spec. A-249. Besides, they pass the most searching non-destructive test applied to stainless tubing anywhere. This extra-close quality control is your assurance of getting the highest possible degree of perfection and dependability in Carpenter Stainless Tubes. That means savings in time, money and trouble for builders and users of heat transfer equipment.

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Stainless Tubing & Pipe

A complete heat treating line is more economical to purchase with General Electric system engineering aid and "one-source" manufacturing responsibility.

HEAT
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How General Electric performs as "one-source" supplier for your complete heat treating line

Next time you have a heat treating problem, don't begin a time-consuming, frustrating shopping tour for heating system components. Instead, call in your General Electric heating specialist. Get all the answers from this one representative who becomes your direct contact for your complete package including furnaces, materials handling equipment, control, atmosphere equipment, and accessories.

Example: A large producer of malleable and pearlitic malleable iron castings reduced his annealing cycle from 144 hours to 48 hours and cut man-hours 50 percent with a modern General Electric system. This complete G-E installation includes 25 electric furnaces, crane equipment and structure, quenching system, switchgear, control, and traveling hoists—all co-ordinated with General Electric engineering aid into an economical, high quality heat treating line.

Relieve yourself of heating system engineering problems. Call in General Electric when you modernize or install a new heat treating line. Contact your nearby G-E Apparatus Sales Office for "added value" assistance. 721-34

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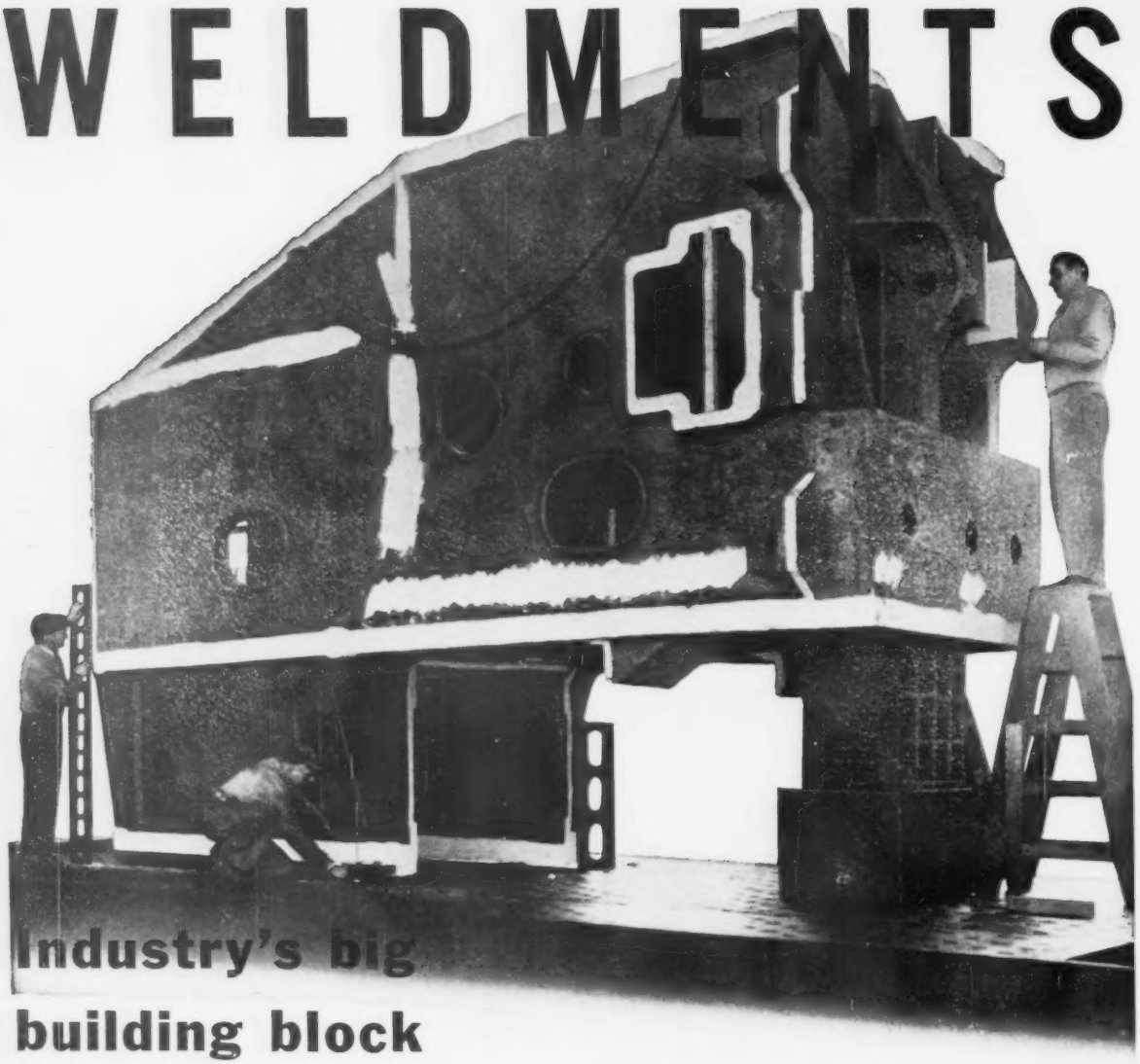

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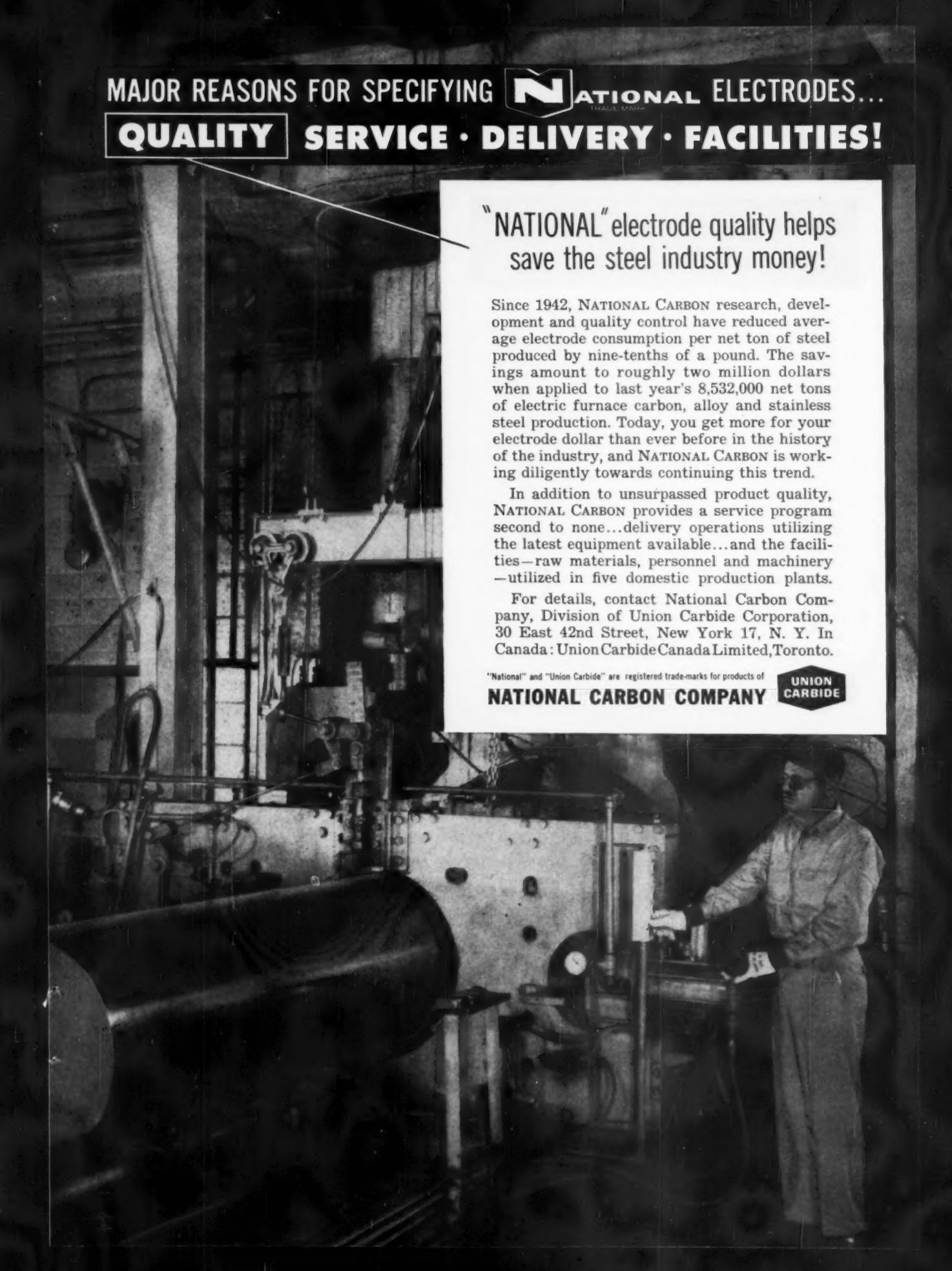
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QUALITY SERVICE · DELIVERY · FACILITIES!
"NATIONAL" electrode quality helps save the steel industry money!
Since 1942, NATIONAL CARBON research, development and quality control have reduced average electrode consumption per net ton of steel produced by nine-tenths of a pound. The savings amount to roughly two million dollars when applied to last year's 8,532,000 net tons of electric furnace carbon, alloy and stainless steel production. Today, you get more for your electrode dollar than ever before in the history of the industry, and NATIONAL CARBON is working diligently towards continuing this trend.
In addition to unsurpassed product quality, NATIONAL CARBON provides a service program second to none...delivery operations utilizing the latest equipment available...and the facilities—raw materials, personnel and machinery—utilized in five domestic production plants.
For details, contact National Carbon Company, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. In Canada: Union Carbide Canada Limited, Toronto.
"National" and "Union Carbide" are registered trade-marks for products of
NATIONAL CARBON COMPANY
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LeBLOND of Cincinnati

CUSTOMER

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TOM RAGSDALE SAYS, "I Make Money

"In my job shop in Denver I have twelve LeBlond Lathes, six of them purchased in the last year. LeBlond Lathes are the best dollar investment I can make."

Tom Ragsdale

L 315 723 349 A

On receipt of this advertisement, before August 1, 1960, the R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio will deliver a valuable and useful article to the sender.

THOMAS A. RAGSDALE

Vice President, Ragsdale Bros. Tool & Die, Inc., Englewood, Colo.

LeBLOND of Cincinnati

THE R.K. LeBLOND

"Having a new LeBlond is better than having the cash." Call a LeBlond representative or ask a LeBlond owner.

TESTIMONIAL

LeBLOND of Cincinnati

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With LeBlond Lathes"

"Tom Ragsdale tells me that his LeBlond Lathes give him a definite advantage over his competition. It's things like this that make me proud I sell LeBlonds."

R. E. DuBoc

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President, R. E. Duboc Associates, Denver, Colo.

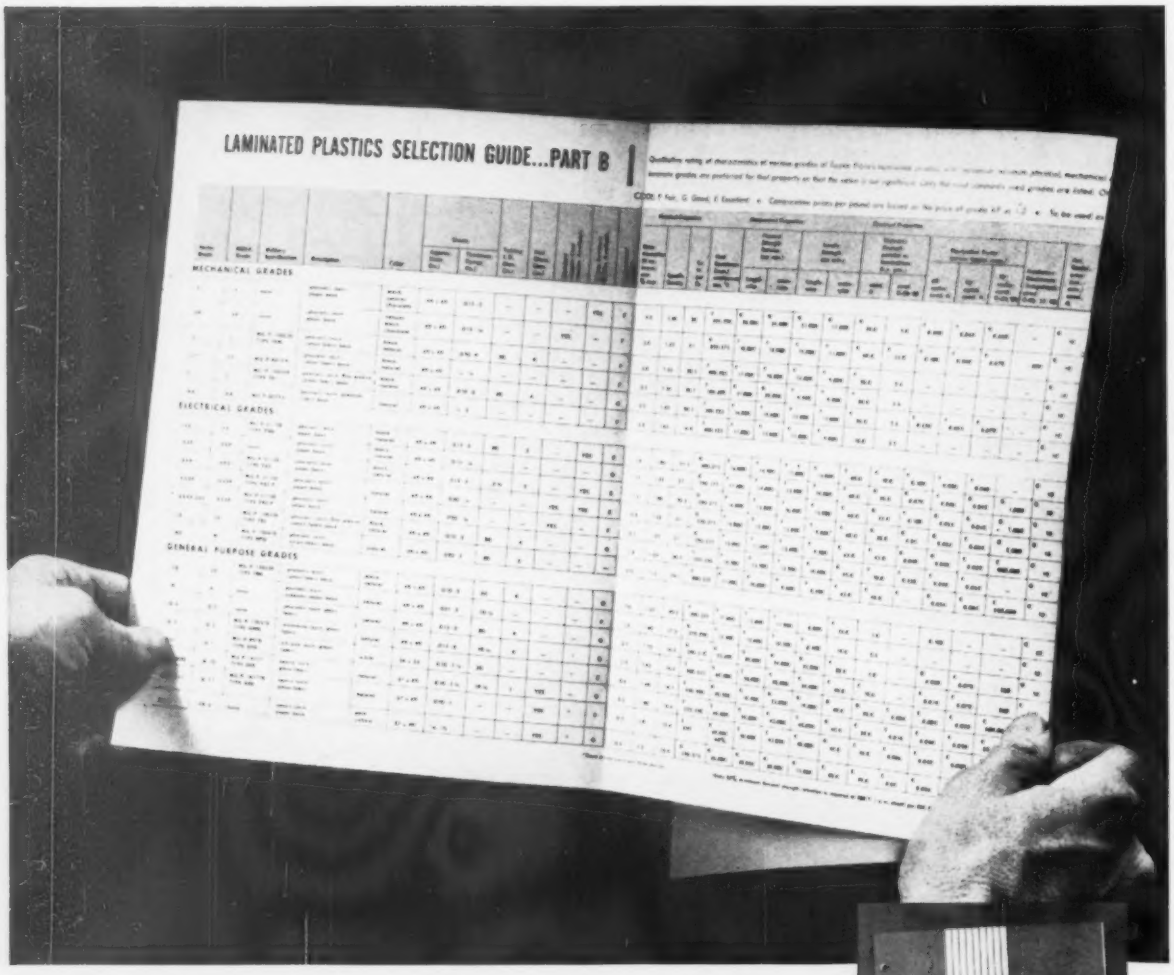
MACHINE TOOL COMPANY

LeBLOND of Cincinnati

The R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio

Important facts to know about laminated plastics

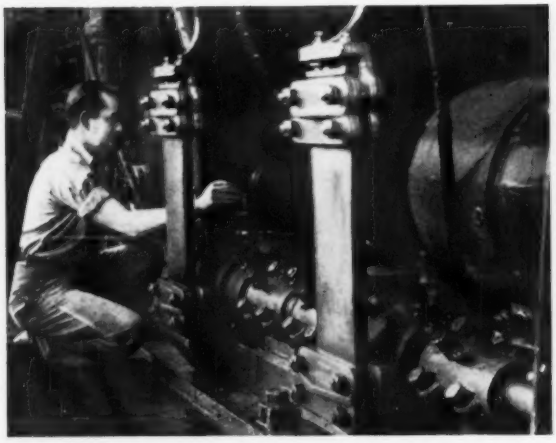
New Guide Developed by Taylor



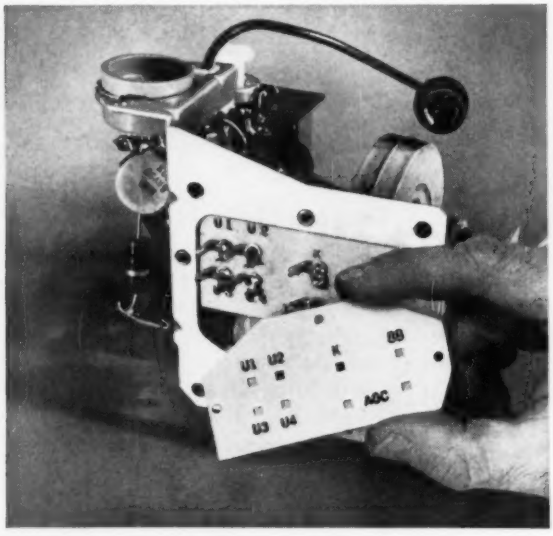
If you have specialized in metals and are considering industrial laminated plastics as a material for certain components in your design for the first time, this newly devised Taylor Selection Guide will help you evaluate the different grades available. The simplified properties chart lists the various grades now produced and clearly indicates the properties in which they excel. An accompanying booklet gives helpful hints on the selection of laminated plastics for your specific application. Write for your copy of this handy Taylor Laminated Plastics Selection Guide today. Use it to make tentative selections of the laminated plastics that most nearly fit your requirements. Then consult us on the design and application of laminated plastics and parts fabricated from them before making a final decision. Our application engineers will be glad to discuss them with you. Write Taylor Fibre Co., Norristown 52, Pa.

Simplifies Laminate Selection

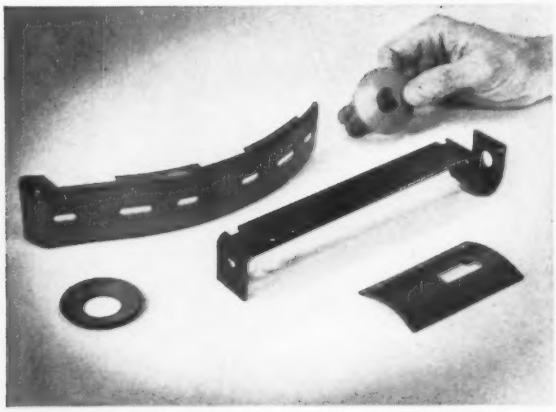
Suggested applications of different grades of Taylor Laminated Plastics



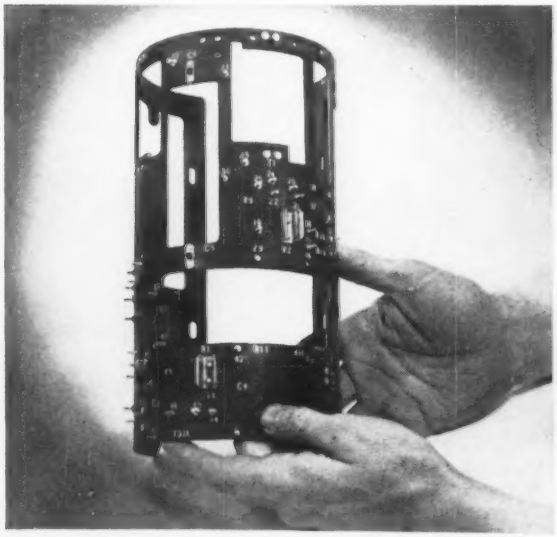
For the fabrication of springs, silent gears, pinions, cams and bearings: Taylor Grade C—a phenolic resin, cotton fabric base, mechanical grade and Taylor Grade L, a phenolic resin, fine weave cotton fabric base grade.



For high-temperature electrical applications and high-frequency radio equipment: Taylor Grade GSC—a silicone resin, glass fabric base, high-heat-resistant electro-mechanical grade.



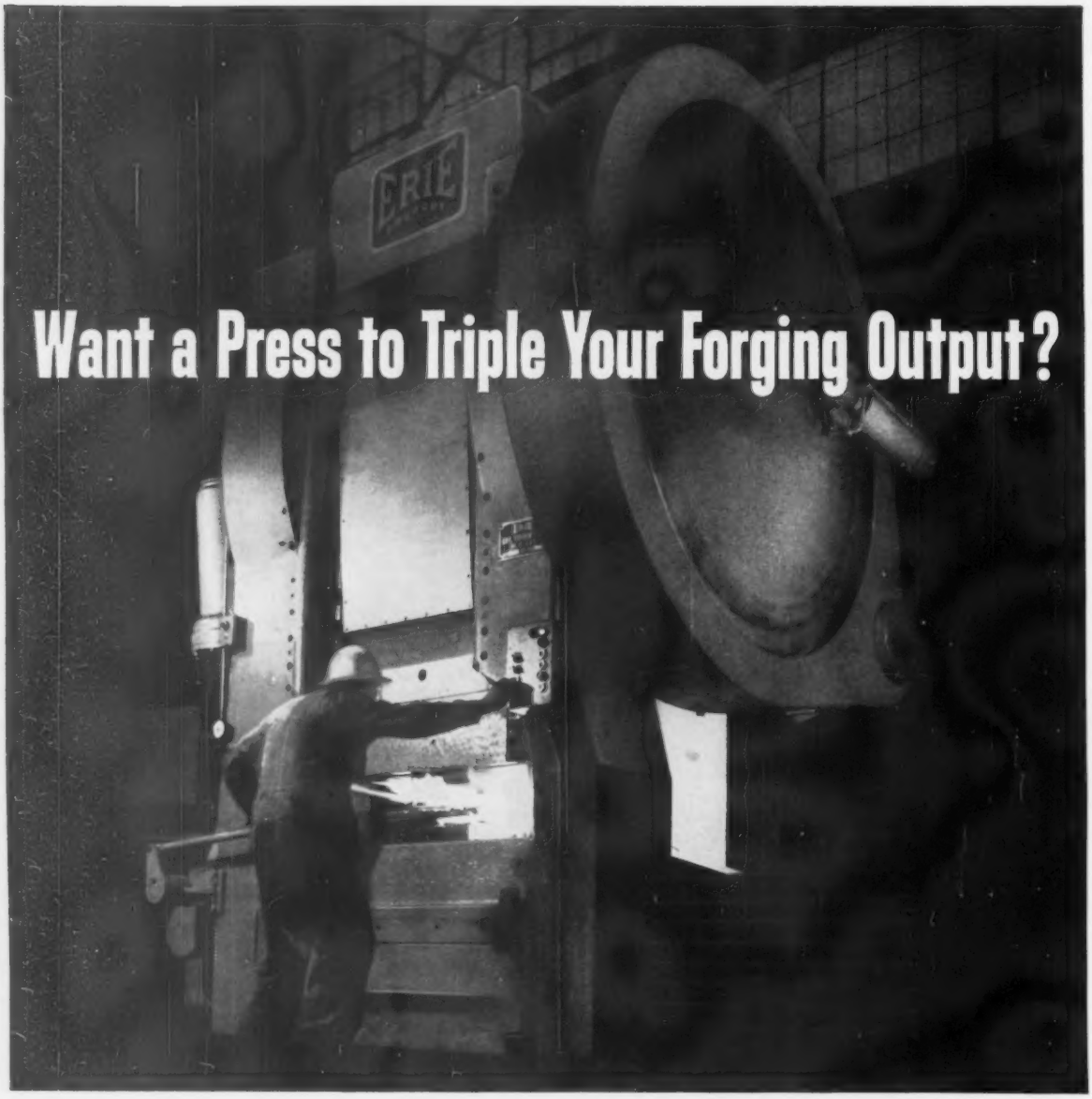
For forming into intricate shapes, compound curves, and deep draws: Taylor Grade C-7—a phenolic resin, cotton fabric base, postforming grade. Also Taylor XX-7—a phenolic resin, paper-base postforming grade.



For applications requiring high-strength retention at elevated temperatures: Taylor Grade GEC—an epoxy resin, glass-fabric base grade.

Taylor

LAMINATED PLASTICS VULCANIZED FIBRE



Want a Press to Triple Your Forging Output?

We'll build the press for all your forging requirements . . .

Tell us your forging problems and give us your production specifications—we'll do the rest.

Erie Foundry, one of the first companies to automate forging, can provide specially designed *high volume* presses in capacities of 1000 to 8000 tons. Instead of the three machines and nine men formerly required, now you need only one Erie automated forging press and only one operator observer—to triple your present production rate! Trimming, too, can be accomplished in a single production cycle. With billet supply and finished part removal conveyorized, it is possible to achieve a production volume of, say, 1200 track-link forgings per hour.

Erie Foundry has a complete line of machines designed for high volume production of such parts as connecting rods, gear blanks, automotive and tractor valves, pinions, track links and wheel hubs.

We would like to discuss application of automated presses to your production requirements. For the complete story, phone or write Mr. R. E. Sanford, Erie Foundry Company, Erie 1, Pa.

ERIE

ERIE FOUNDRY CO.

The world's great name in forging since 1895 EF-59-01

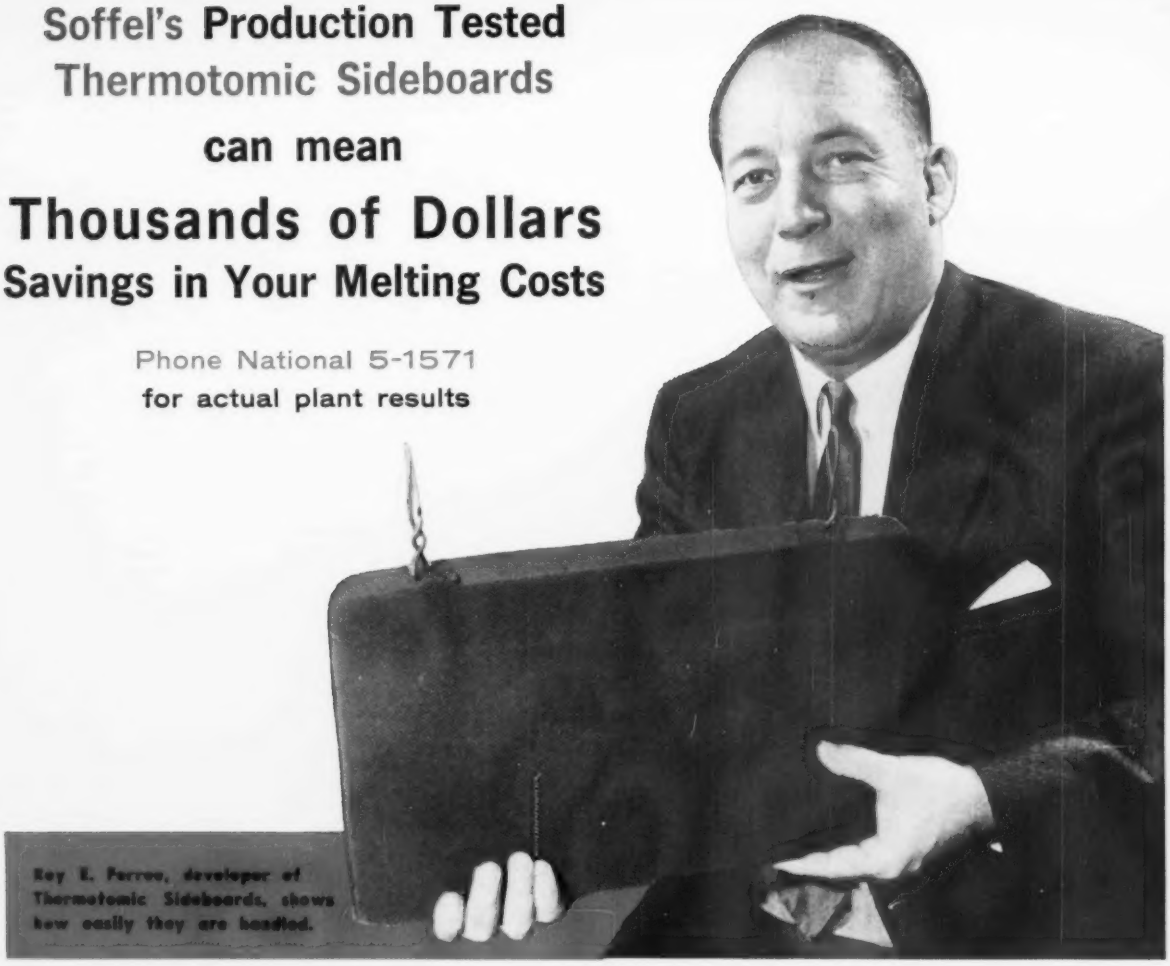
Soffel's **Production Tested** Thermotomic Sideboards

can mean

Thousands of Dollars

Savings in Your Melting Costs

Phone National 5-1571
for actual plant results

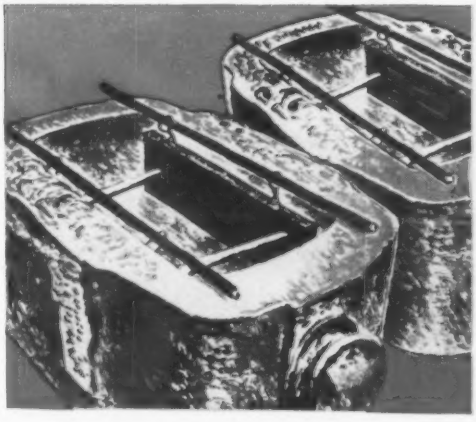


Roy E. Farrow, developer of Thermotomic Sideboards, shows how easily they are handled.

Soffel's Thermotomic Sideboards are being used in the production of alloy steel ingots. Results show a substantial increase in ingot yield as well as improvement of quality. Currently, experiments are being run on carbon and other grades. Results to date are even superior to those obtained in alloys. Each mill must have the exothermic compound designed especially for its specific pouring conditions, mold design, etc.

Based on our wide experience, we will be happy to design and engineer Thermotomic Sideboards which will meet your exact requirements.

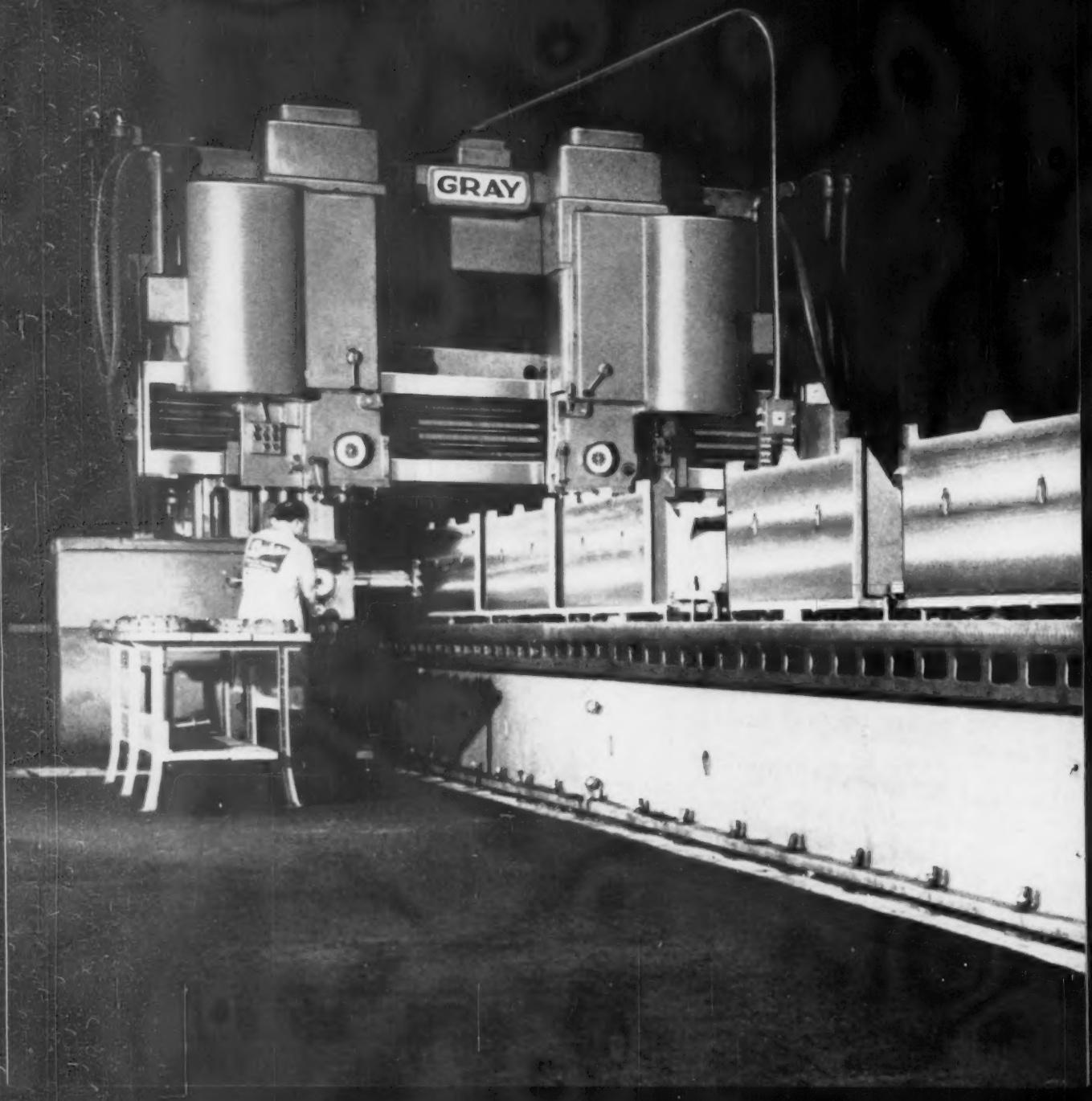
Call us Today

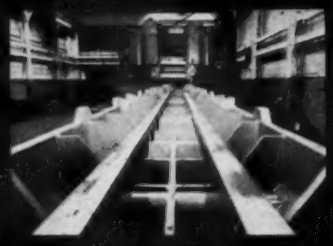


PITTSBURGH METALS PURIFYING CO., INC.
Phone: NAtional 5-1571 • Mars, Penna.

"WORLD'S LARGEST MANUFACTURER OF FLUXES, PURIFIERS AND EXOTHERMIC COMPOUNDS FOR ALL METALS AND ALLOYS"

progress starts



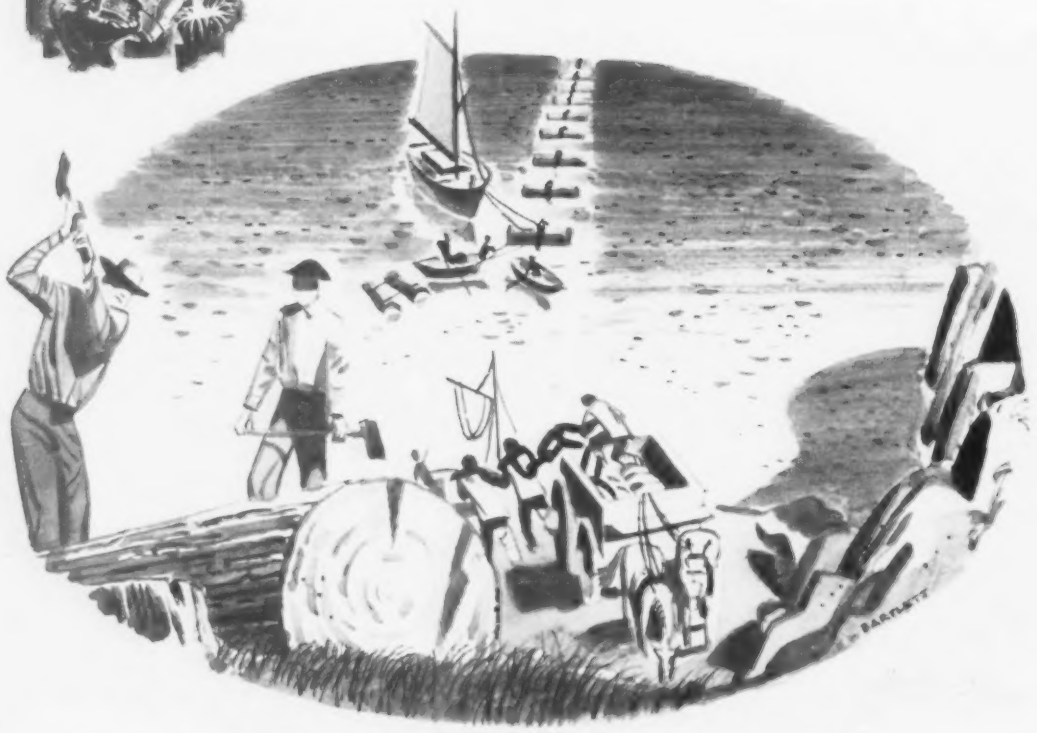
on  a GRAY

What you see being milled on this big 105 foot long Gray, are transfer machine bases of the future... six at a time... automation production machines of Buhr Machine Tool Co., of Ann Arbor, Michigan. It's logical that this company, engaged in producing cost cutting, time saving equipment, should select a cost cutting, time saving Gray to do the job.

Gray unit head planer type millers dominate the field of modern heavy duty milling. This 66" x 66" x 50' giant can simultaneously deliver 300 H. P. to its four cutters. Duplex tables virtually eliminate idle time by permitting work set-up on one section, while work is being milled on the other section. Unusually simple control encourages maximum operator efficiency. All this, plus mirror smooth surfaces milled to precise tolerances maintain the Gray reputation for top quality the world over.

The G. A. GRAY Co., Cincinnati 7, Ohio

AMERICAN ORIGINALS IN IRON AND STEEL



The chain that stopped the British Navy

During the War for Independence, the iron industry expanded greatly because of the increased demand for cannons, cannon balls and other war materials. However, one of the most interesting and outstanding contributions towards the cause was a chain that stopped the British Navy from going up the Hudson River beyond the Fort at West Point.

In 1778, the Sterling Works, some 25 miles southwest of West Point, operated all their forges day and night to make a massive chain 1500 feet long. Each link was 2 feet long and weighed 100 pounds. This chain was carried to West Point, floated on logs and stretched across the Hudson, where it made a formidable barrier no British gun boat dared to cross.

History is filled with many such important contributions made by the iron and steel industry. We at The J. E. Baker Company are proud of the fact that, since 1889, this vital industry has relied on Baker's Magdolite and Jebcolite, the original dead-burned dolomites, for more uniform ingots, greater furnace efficiency and lower refractory costs. Magdolite and Jebcolite offer many advantages . . . in superior composition, preparation, strength, economy and quality.

ANOTHER AMERICAN ORIGINAL

JEBCO
PRODUCTS
SINCE 1889

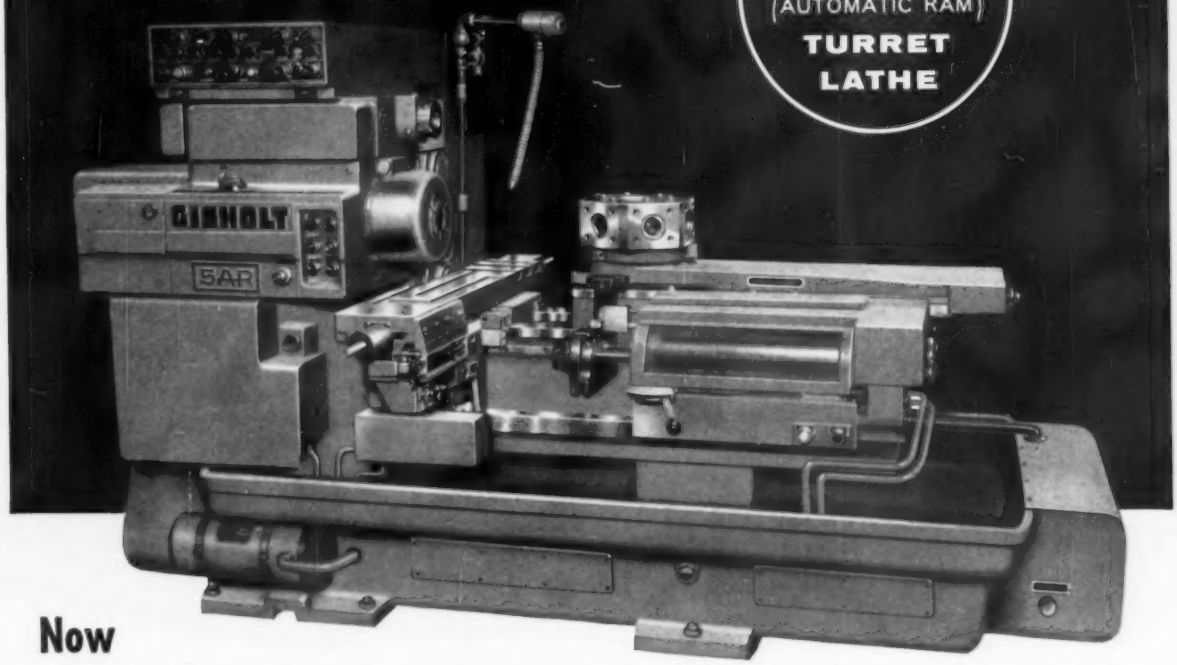
BAKER'S MAGDOLITE
The original dead-burned dolomite

THE J. E. BAKER COMPANY

YORK, PENNSYLVANIA • PLANTS: BILLMEYER, YORK, PENNSYLVANIA • MILLERSVILLE, OHIO

ANNOUNCING

the new GISHOLT AR (AUTOMATIC RAM) TURRET LATHE



Now one machine does both bar and chucking work...automatically

Here is a ram-type turret lathe "gone automatic." It's the new Gisholt MASTERLINE AR. It handles both bar and chucking work. Changeover takes less than 1 hour. But that's not all. It combines the efficiency and consistent production of an automatic with fast setup and versatility. Yet, the new AR costs very little more than a hand-operated turret lathe!

For long runs or small lots. Whether you are now using automatics for long runs, or standard ram-type turret lathes for small lots, you'll want to evaluate this new development in automatics. You will quickly see how the new AR will cut your costs. Based on productivity, capacity, versatility, dependability, ease of operation, setup speed and original cost, you'll find it's a new best buy for your equipment dollar today!

Ask for desk-side demonstration. Your Gisholt Representative will gladly explain the cost-cutting features of the new AR and show you how it can boost profits for you. Ask for your personal, desk-side demonstration or write for literature.

Investigate Gisholt's Extended Payment and Leasing Plans

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes • *Factory-Rebuilt Machines with New-Machine Guarantee*

How are they doing down on the farm?

Nowadays they're doing everything a lot easier, thanks to modern power-operated farm machinery.

And farm machinery producers have learned that their lot can be a lot easier, too, when they specify Ostuco Tubing. That's because there's no compromising with custom-quality Ostuco Tubing. Consistently you receive the exact tubing you want — the size, length, grade — with the strength and tolerances you need. For machined parts, you get our recommended rough size guaranteed to clean up.

In addition to these advantages, Ohio Seamless will fabricate tubular parts to your specification. Contact your nearest Ohio Seamless representative, or send part drawings to the plant at Shelby, Ohio—Birthplace of the Seamless Steel Tube Industry in America.

A-1356A

Complimentary Copy of new Bulletin CS60 "Ostuco Steel Tubing" sent on request.

Model illustrated built to 3.5 mm scale.

OSTUCO SHELBY, OHIO

OHIO SEAMLESS TUBE

Division of Copperweld Steel Company • SHELBY, OHIO

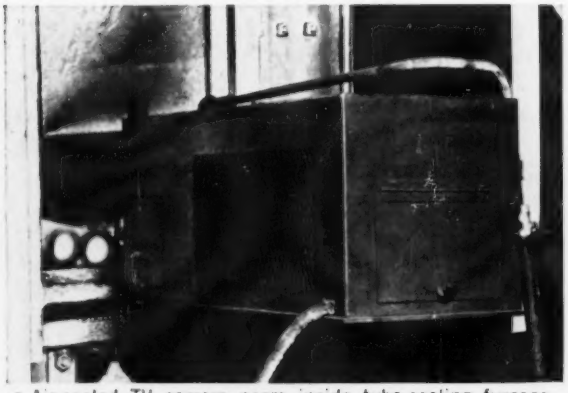
Seamless and Electric Resistance Welded Steel Tubing • Fabricating and Forging

SALES OFFICES: Birmingham, Charlotte, Chicago (Oak Park), Cleveland, Dayton, Denver, Detroit (Huntington Woods), Houston, Los Angeles (Lynwood), Miami, Moline, New Orleans (Chalmette), New York, North Kansas City, Philadelphia (Wynnewood), Pittsburgh, Rochester, St. Louis, St. Paul, Salt Lake City, Seattle, Tulsa, Wichita

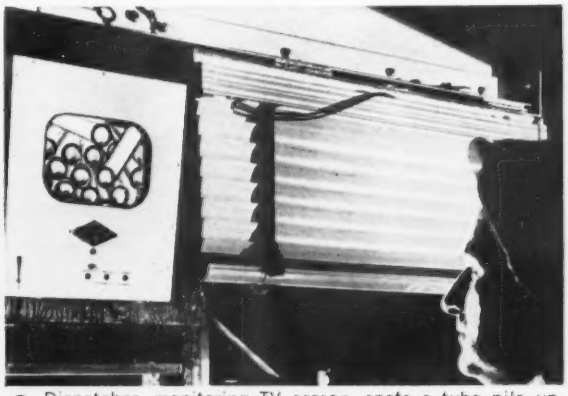
CANADA: Railway & Power Engr. Corp., Ltd. EXPORT: Copperweld Steel International Company, 225 Broadway, New York 7, New York

How Diamond TV cuts costs for Timken Company

"Utiliscope"® *pays for itself in just eight months*

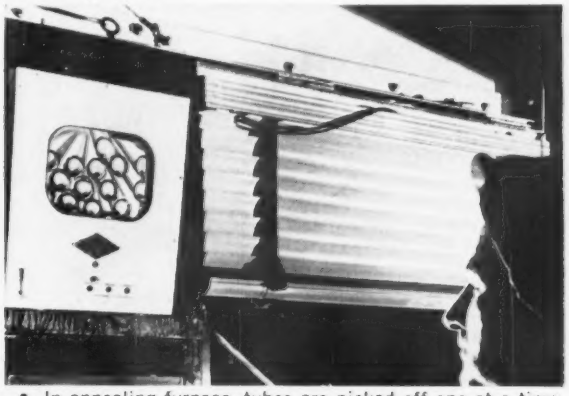


1 Air-cooled TV camera peers inside tube-cooling furnace, transmitting continuous picture to dispatcher in control pulpit 100 feet away. Dispatcher checks television monitor image which shows progress of tubes on walking beam conveyor — watches for pile up of tubes at conveyor exit.



2 Dispatcher, monitoring TV screen, spots a tube pile up instantly. Time lag in old method . . . hand signals from man at furnace port . . . could not have prevented piled tubes from gouging furnace refractory lining before conveyor could be stopped. Costly damage is eliminated . . . production efficiency improved!

3 With piled tubes realigned, cooling production continues with conveyor speed adjusted to prevent recurrence. Dispatcher now flips to second "Utiliscope" on adjacent annealing oven — the next step in tube production where tubes are piled cord-wood style.



4 In annealing furnace, tubes are picked off one at a time at back of furnace by powered rollers under dispatcher's control. Here, dispatcher watches for bridging of tubes which can prevent movement onto delivery conveyor. All clear here, again no spotter is required, again production flow is smoothed and protected with extreme accuracy.

In summary, one dispatcher at Timken's Canton, Ohio, Steel Mill now controls with greater overall efficiency: (1) tube mill, (2) tube cooling furnace, (3) annealing oven. Ambients at the camera location are above 125°F. Tube making is a hot process. It is in this hot spot that signalmen, formerly required, had to work. The signalmen are now working on more skilled jobs in relatively cool work areas.

Diamond's "Utiliscope" provides the metals industry the opportunity to eliminate non-productive tasks, centralize production control, reduce waste, increase employee morale, and gain new operating safety.

Our trained application engineers know the problems of providing effective trouble-free service in hot, tough, dusty locations. They are available to you as assistants in your analysis of the application of television to your open hearth, oxygen process, slab reheat, melting tables, strip mills, shears, raw materials, handling, pouring . . . or any of the other more than thirty known applications.

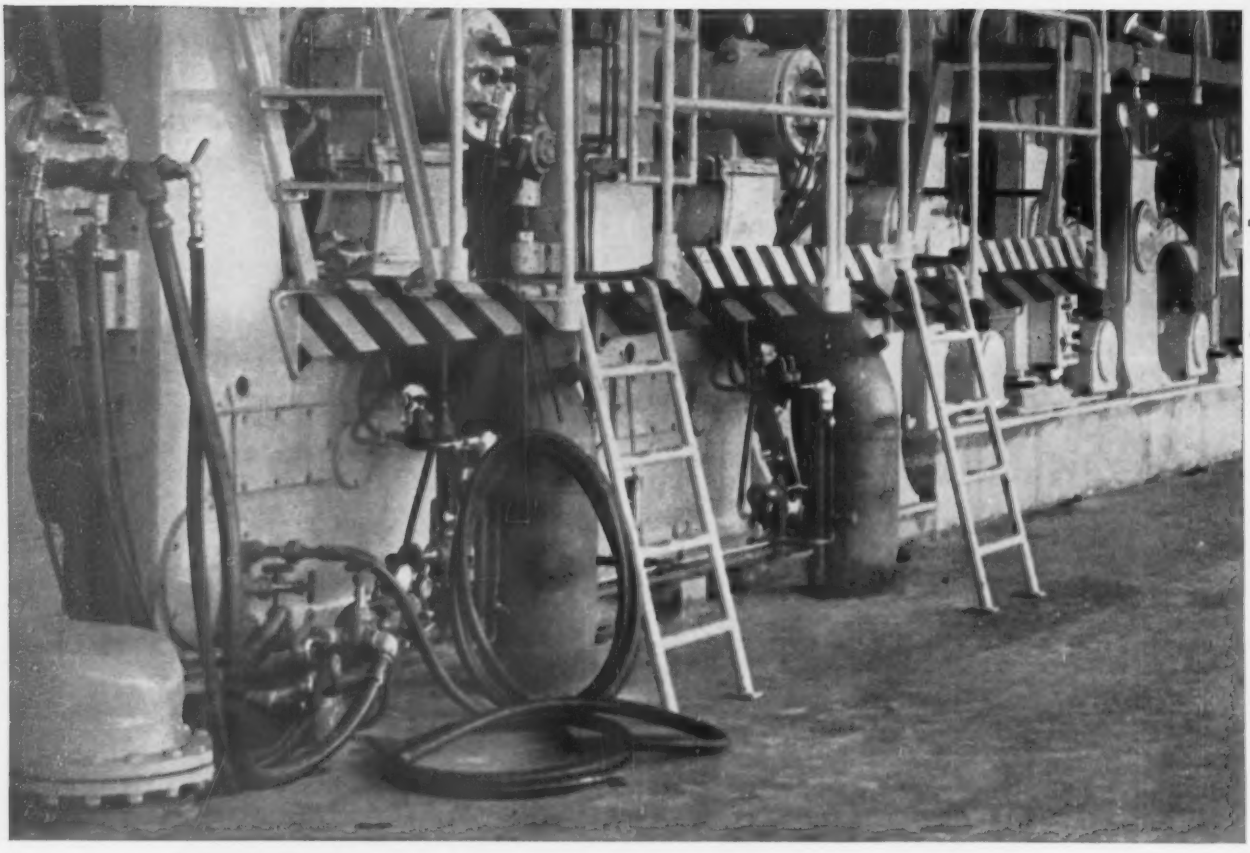
Why not request Field Survey FS33A today? Phone Lancaster, Ohio, OLive 3-6540 or TWX 490.

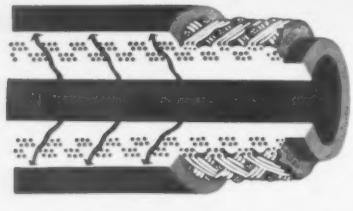
HELP WANTED . . . *Challenging opportunities available at Diamond Electronics for physicists, electronic and mechanical engineers. Contact C. E. Thomas, Technical Personnel.*

Diamond® Electronics

DIVISION OF DIAMOND POWER SPECIALTY CORPORATION

LANCASTER, OHIO





"MORE USE PER DOLLAR"

Rubber tie-gum penetrates Homoflex braided plies to provide an inseparable tube-to-cover bond . . . greater flexibility and lighter weight than any hose for equal pressure.

R/M HOMOFLEX HOSE HANDLES EASIER . . . LASTS LONGER

Homoflex Hose is mandrel-made with *no* pre-set twist—it coils and uncoils freely in *any* direction *without* kinking! It's the easiest handling hose made, in types for air, water, other fluids and gases. Exclusive Homoflex construction makes strength member and tube virtually inseparable, assures longer, trouble-free service life. Uniform inside and outside diameters permit faster, easier, *safer* coupling . . . faster, fuller flow.

Strong, light weight, and "flexible as a rope", Homoflex Hose adds up to real labor and cost savings wherever you use it around the plant. Let your R/M Distributor show you the many advantages of Homoflex and other types of R/M rubber hose for factory use.

- **SUPER-STRONG**
- **PRECISION BUILT**
- **LIGHT WEIGHT**
- **FLEXIBLE AS A ROPE**

Write for Bulletins M694 and M610

RM-1029

RAYBESTOS-MANHATTAN, INC.
MANHATTAN RUBBER DIVISION, PASSAIC, NEW JERSEY

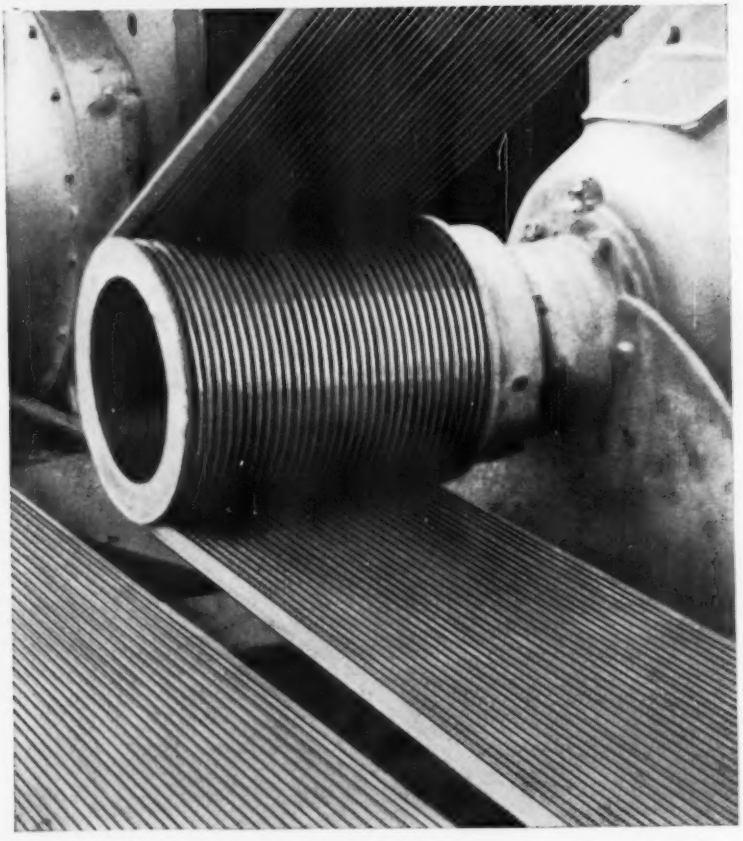
R/M

ENGINEERED RUBBER PRODUCTS ..."MORE USE PER DOLLAR"

RAY-MAN CONVEYOR BELT

Engineered for 45° Idlers

You can now get up to 60% greater hauling capacity—save up to 20% on conveyor costs—as compared to using regular 20° idlers. Ordinary ply belts are too stiff and boardy to do the job—Ray-Man's exclusive flexible construction and built-in stress compensation is *guaranteed* to take the sharp angle of 45° idlers *without* ply or cover separation at the hinge line. Learn how Ray-Man Conveyor Belt opens up a whole new era of conveyor design . . . permitting larger loads . . . narrower conveyors—assuring longer cover wear, lower handling costs! Write for Bulletin M303.



R/M POLY-V® DRIVE

More Power— in *Less* Space *. . . with Reliability*

A *single unit* V-ribbed belt across full width of the drive-sheave—*not* an assembly of V-belts—enables patented Poly-V to deliver much *more* power in the same space as a V-drive . . . or *equal* power in much *less* space! Single unit belt design also eliminates belt "length matching" problems . . . minimizes equipment down-time and belt replacement costs. Belt speed ratios remain constant from *no* load to *full* load to provide the smoothest running, coolest running—*longest wearing* drive you can install. Maintain groove shape. Just two sections of Poly-V Belt meet every heavy duty power transmission requirement. Write for Bulletin M141, or call your R/M Distributor.

CONVERT TO RM POLY-V and BE SURE!

INCREASE CAMPAIGN LIFE UP TO 18 MONTHS WITH KAISER BLAST FURNACE CASTABLE*

WHAT IS KAISER BLAST FURNACE CASTABLE? It is a dry-mix gunning material for the full range of blast furnace lining, including area below the tuyeres. The material is a hydraulic setting, high strength clay product made with a very pure calcium aluminate binder (low in iron to resist effect of CO disintegration, and high in strength to resist abrasive conditions).

WHEN SHOULD IT BE USED? Kaiser Blast Furnace Castable was developed specifically to provide a quick, economical and dependable means of prolonging furnace life without a major reline. Thus, it may be used when a furnace must be kept on the line to meet heavy production schedules, or it may be used to improve production economy by extending normal productive life of a furnace.

HOW FAST CAN THE MATERIAL BE PLACED? When down time is an important consideration, Kaiser Blast Furnace Castable can be gunned into place—around the clock—at a rate of up to 9000 pounds per hour per gunning unit. Service can be resumed in a fraction of the time needed for other methods of repair or rebuild! Curing is accomplished with normal heat-up procedure. (Actual down time varies, of course, with amount of surface preparation—cleaning slag, coke, limestone, etc. from the existing brickwork.)

WHAT IS THE COST AS COMPARED TO BRICK? Cost of actual repairs made with Kaiser Blast Furnace Castable is only about one-fourth the cost of repairs made with brick. Even more important, cost- and profit-wise, is the additional iron production made possible by increased campaign life.

HAS KAISER BLAST FURNACE CASTABLE BEEN PROVED IN SERVICE? Yes. The three locations described at right show the range of installations now in service.

*Formerly MEX-R-CO BF Blast Furnace Castable.

LOCATION NO. 1. 28-ft. diameter furnace, capacity 2000 N. T. per day. 287 tons Kaiser Blast Furnace Castable installed, starting at tuyeres and extending to wear plates. Thickness of material varies from 6 to 26 inches. Total installation time: 90 hours.

INCREASED CAMPAIGN LIFE: 15 months (and still in service).

LOCATION NO. 2. 20-ft. diameter furnace. 65 tons Kaiser Blast Furnace Castable installed, beginning slightly below tuyeres and extending upward toward mantle. Thickness of material varies from 4½ to 13½ inches. Total installation time: 22 hours.

INCREASED CAMPAIGN LIFE: 12 months (and still in service).

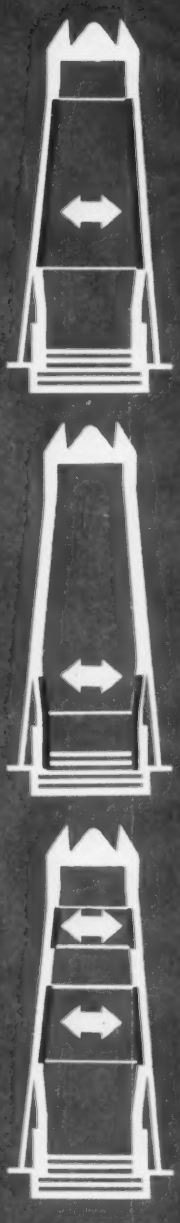
LOCATION NO. 3. 28-ft. diameter furnace, capacity 1300 N. T. per day. 100 tons Kaiser Blast Furnace Castable installed: one section extending from mantle upwards 16 feet with average thickness of 16 inches; second section extending from wear plates downwards 10 feet, with average thickness of 7 inches. Total installation time: 29 hours.

INCREASED CAMPAIGN LIFE: 12 months.

For full details on these installations—and to learn how you can achieve increased campaign life—contact your Kaiser Refractories sales representative.

Call or write Kaiser Refractories and Chemicals Division, Dept. S0121, Kaiser Aluminum & Chemical Sales, Inc., at any of the Division Offices listed below:

PITTSBURGH 22, PA. . . . 3 Gateway Center
MEXICO, MISSOURI . . . Mex-R-Co Building
OAKLAND 12, CALIF. . . 300 Lakeside Drive



KAISER REFRACTORIES

MEXICO REFRACTORIES NOW MERGED WITH KAISER REFRACTORIES
MEX-R-CO High Alumina, Fire Clay and Silica Refractories
Kaiser Periclase Brick, Mortars, Grains and Ramming Mixes

"We break every rule in the book

"We have one of the toughest testing programs in the entire industry. It breaks every safety rule that's ever been invented so that we can find out just how much punishment a grinding wheel can take.

"The test shown here, for example, is for heavy-duty snagging wheels that are used in foundries and steel mills. The wheel under test is locked into a steel drum that's built like a gun turret. Then the wheel is spun at speeds far beyond anything you can get with even the latest production equipment . . . until it finally explodes. Such tests as these have helped us formulate snagging wheels for manufacture with a *safety factor higher than ever before.*

"This, of course, is only one of the more spectacular tests we make on all Bay State wheels. There are many others that probe the ultimate strength factors of every type of wheel under extremes of heat, vibration, tension, torsion and many other variables. And the purpose of these tests goes beyond ordinary standards, too. We are not just trying to produce *acceptable* wheels. We are out to make the best wheels that can be made . . . no matter *what kind* of wheels they may be!

"The record shows that BAY STATE quality also leads to lower grinding costs. You'll find your Bay State distributor or direct representative completely equipped and thoroughly trained to analyze your grinding operations for optimum performance and minimum cost."

"*Better grinding at lower cost . . . that is our business.*"

for YOUR SAFETY . . ."

Elden L. Auker, Marketing V. P. of Bay State Abrasives, is a man who knows the industry through years of experience both in working in the field with Bay State customers and from close association with the research and development programs at Bay State's manufacturing headquarters in Westboro, Mass.

BAY STATE ABRASIVES

BAY STATE
WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Chicago, Cleveland, Detroit, Los Angeles, Pittsburgh. *Distributors:* All principal cities.

V-R

CREATING THE METALS THAT SHAPE THE FUTURE

Quality carbide starts with purity

There's no secret to producing quality carbide at V-R because it's a simple matter of starting with highest purity raw materials and maintaining this purity and uniformity throughout all processes.

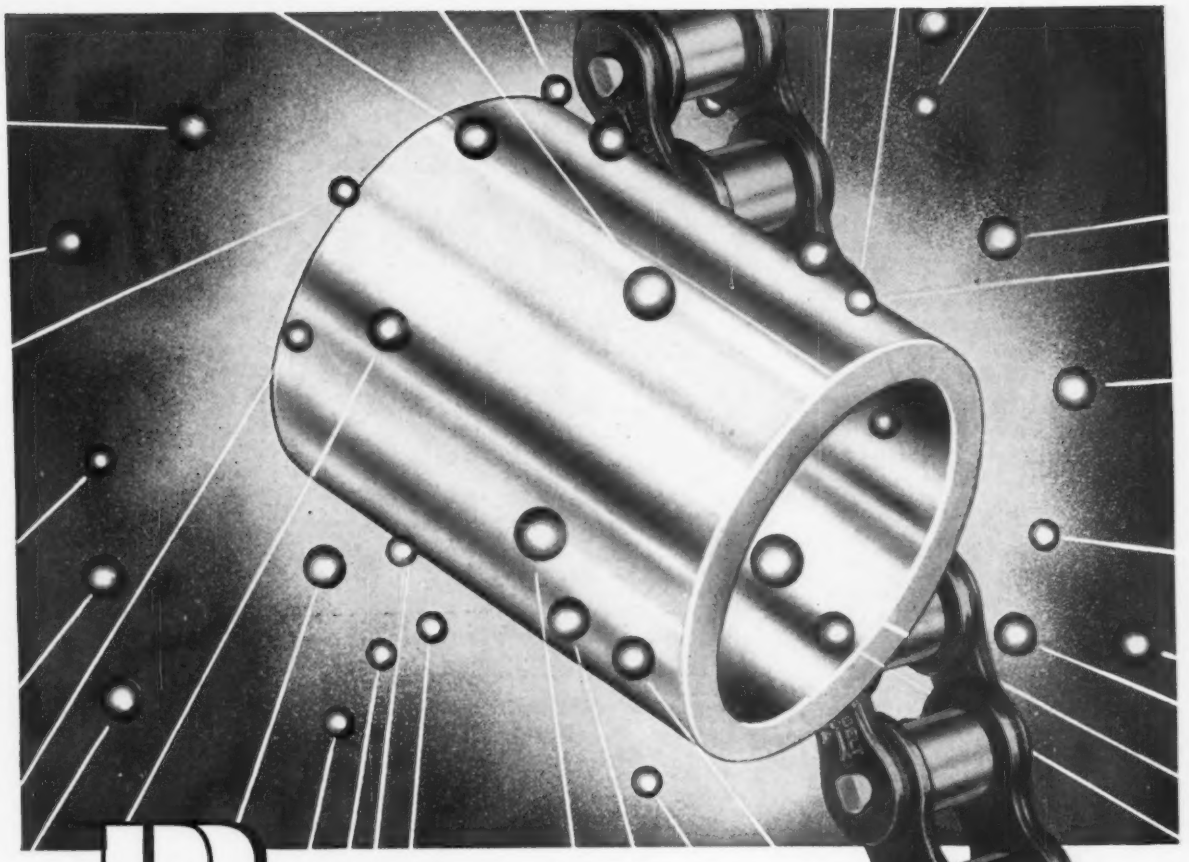
At V-R, the finest in modern equipment is effectively combined with the metallurgical knowledge gained through 30 years of carbide research and manufacturing experience . . . *this experience means better carbide for every use.*

Above is a good example of V-R's quality control. This X-Ray Fluorescent Spectrograph tells the exact composition and amount of each component in the material being tested — assuring purity of raw materials and uniformity of powdered metal compositions.

V-R VASCOLOY-RAMET

818 MARKET STREET • WAUKEGAN, ILLINOIS

C-775



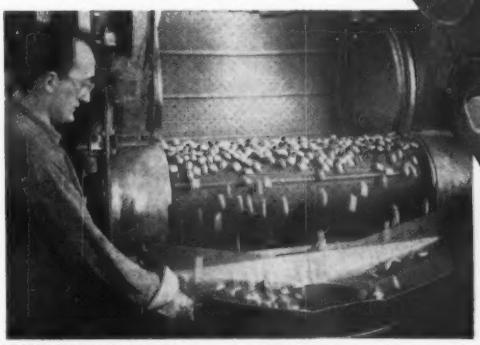
Rollers

fortified against fatigue

Shot-peening "cold-works" extra fatigue life into LINK-BELT roller chain

Shot-peening gives rollers of Link-Belt precision steel roller chain exceptional strength and stamina. And after shot-peening, they are burnished rather than ground or sanded. This achieves a SILVER-BRITE finish—and more important, *retains the fatigue resistant qualities of shot-peening.*

Other long-life "extras" of Link-Belt roller chain include: close heat-treat control, lock-type bushings, pre-stressing, pitch-hole preparation. For details, see Book 2657.

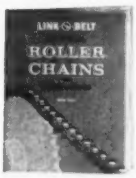


LONG LIFE AHEAD! Rollers for Link-Belt precision steel roller chain tumble out of shot-peening machine after being cold-worked to withstand punishment of today's high-speeds and heavy loads.

LINK-BELT

ROLLER CHAINS AND SPROCKETS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 15.081



BOOK 2657 has 154 pages of roller chain data. For your copy, contact your nearest Link-Belt office or authorized stock-carrying distributor. (See CHAINS in the yellow pages of your phone book.)

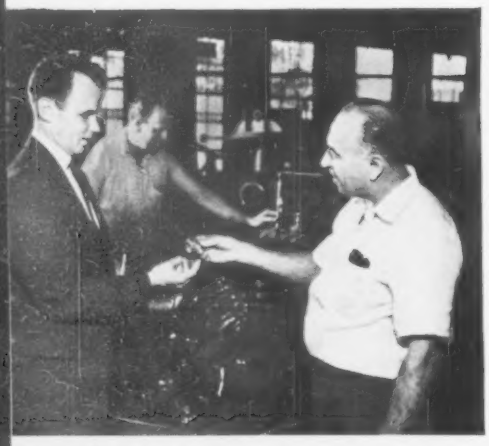
This shop cuts costs by using STANICUT Oil 137

Machines seven metals, one plastic with this one cutting fluid

Shank Manufacturing Company, Chicago, cuts production costs three ways by using STANICUT Oil 137 BCS. (1) The 15 Warner & Swasey Lathes are never down for change of cutting fluid when the metal being worked is changed. There's no time lost with shutting down, cleaning up and changing oil. (2) There are no losses from the use of the wrong cutting fluid. (3) Floor space is used for productive machinery instead of being tied up as storage space for barrels of different cutting fluids.

Titanium, brass, alloy steel, aluminum and seven grades of Stainless plus Teflon plastic are all worked on the machines. Latest equipment, a reputation for good work, experienced operators and on-time delivery keep business coming to Shank. STANICUT Oil 137 BCS helps Shank hold down manufacturing costs.

Does cutting costs with a cutting fluid interest you? Let one of Standard Oil's experienced lubrication specialists show you how STANICUT Oil 137 BCS can do it. Call the Standard Oil office nearest you in any of the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**



Commercially pure AMS 4921 Titanium oxygen injector nozzle gets an inspection from Frank Kruppe, Shank president (right), and Standard Oil's Henry Krueger. Hank Krueger provides Shank plant with technical service on cutting fluids and lubrication. Hank has the experience for this work. He's been doing it for six years. He has an engineering degree from Illinois Institute of Technology and has completed the Standard Oil Sales Engineering School course.

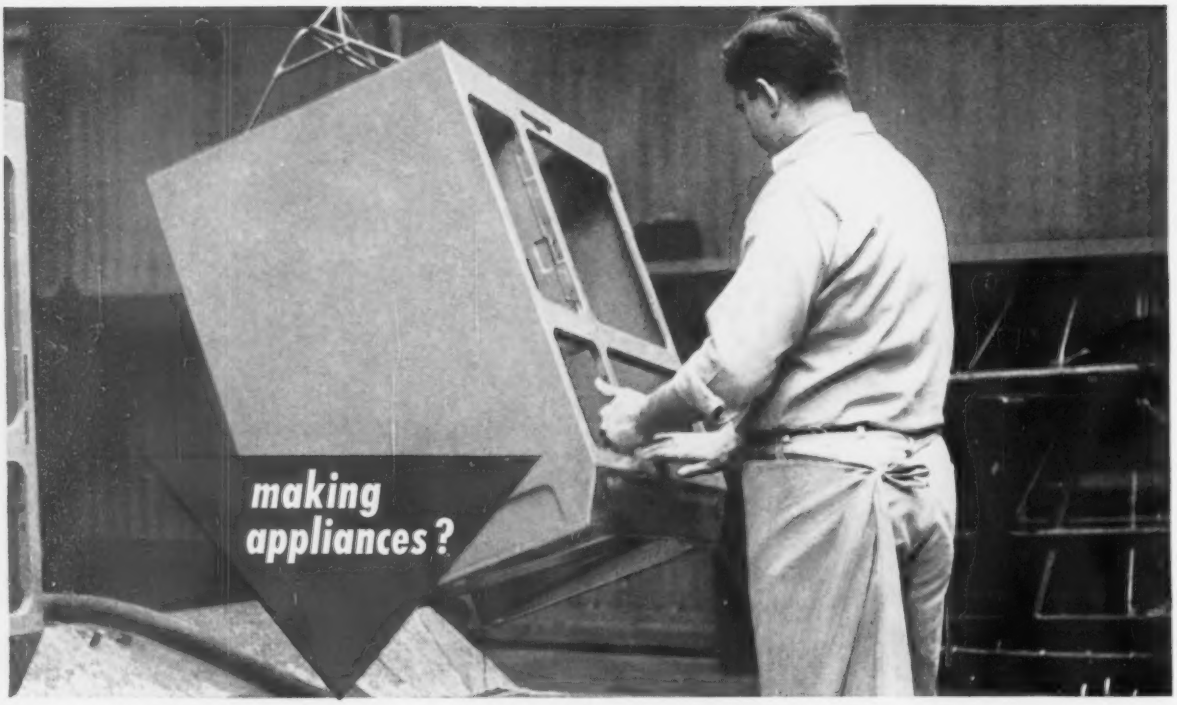
Quick facts about STANICUT OIL 137 BCS

- Has excellent extreme pressure properties. Ideal for low machinability steels.
- Has medium-low viscosity. Low enough for rapid, cooling flow. High enough to avoid "fogging".
- Non-corrosive to aluminum, *titanium* and all steels, tools and machines.
- Sterile, non-irritating and non-toxic.
- Suitable for many operations—tapping, threading, drilling, gear shaving, broaching, etc. Gives excellent tool life.

You expect more from **STANDARD** *and you get it!*

BCS

"Miking up" one of the pieces Shank produces, Frank Kruppe shows Hank Krueger quality of work turned out using STANICUT Oil 137 BCS.



Pennsalt system approach makes finishing dollars go further

Ever take a close look at what your plant spends to prepare metal surfaces for finishing? As a typical appliance manufacturer, you'll spend $100,000 or more each year for metal preparation chemicals . . . and have several million dollars invested in the equipment in which they're used.

To get the most from this considerable investment, you need to be sure your machines and chemicals are working together. And that's what you get with Pennsalt's System Approach to metal surface preparation. Because Pennsalt supplies both the chemicals and the equipment, we can treat your metal finishing line as an integrated system . . . to make your investment pay off in peak production, top quality and low unit cost.

We make sure you keep getting top performance, too . . . with Pennsalt's Metal Preparation Service Plan. Our complete, personalized service, from a nationwide organization of experienced men, analyzes your metal preparation needs, recommends the right equipment and chemicals, aids installation and startup of automatic machines and follows up with regular service calls. Write for free booklet 344, "The Pennsalt Metal Preparation Service Plan."

Pennsalt Metal Finishing Equipment

Washers
Automatic coating machines
Automatic phosphatizing machines
Automatic pickling machines
Drying and finish bake ovens
Paint spray booths
Complete finishing systems

Pennsalt Metal Processing Materials

Cleaners for all metals
Etchants and brighteners
Descaling and pickling compounds
FOSBOND® phosphating agents
FOSCOAT® pre-lubricant coatings
FOSLUBE® drawing lubricants
DRAWCOTE® deep-drawing lubricants
Paint strippers and strippable vinyl coatings

. . . a better start for your finish®

Pennsalt Chemicals
ESTABLISHED 1850

METAL PROCESSING DEPARTMENT
PENNSALT CHEMICALS CORPORATION
East: 3 Penn Center, Philadelphia 2, Pa.
West: 2700 S. Eastern Ave., Los Angeles 22, Calif.

proven design features . . .

Here is the first in the all new, field tested line of heavy duty Nebel Lathes.

It is a versatile extension bed gap lathe, providing 26½" swing over the upper bed, 46" swing through the gap and 48" to 84" distance between centers in the base length.

It is built to complete A.S.A. standards and tolerances of accuracy for engine lathes, still maintaining Nebel economy.

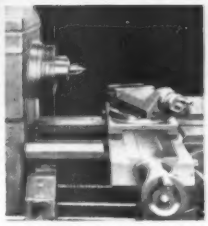
- Heavy duty 3-bearing spindle with zero precision bearings.
- 18 spindle speeds through complete gear range . . . up to 1500 RPM . . . streamlined speed selection.
- 60 different feeds . . . 60 thread changes, all directly read.
- Automatic lubrication.
- Wide design carriage with 146 square inches of bearing surface on bed ways.
- Double-wall one piece totally enclosed apron with simplified controls.
- End gearing totally enclosed in self-lubricating housing.
- Power traverse heavy duty tailstock with rugged thrust lock.
- Rigid box girth design of upper and lower bed . . . hardened and ground steel bedways on upper bed.
- Maximum diameter in gap faced in one setting of tool.

Write for new, fully descriptive Bulletin No. 211.

Nebel Lathe Division • Nebel Machine Tool Corp.
3415 Central Parkway, Cincinnati 25, Ohio

NEW

a versatile gap lathe

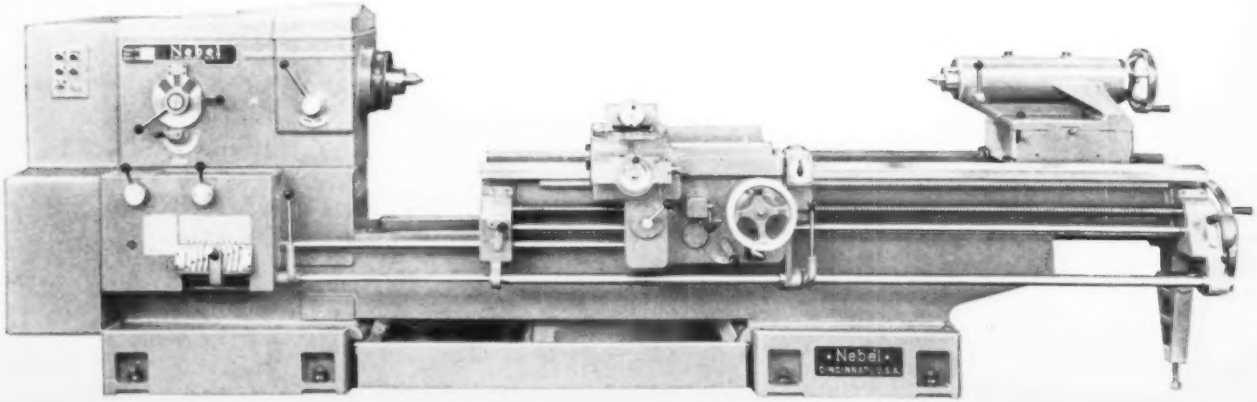


a rugged engine lathe

NēBEL

HEAVY DUTY DOUBLE PURPOSE LATHE

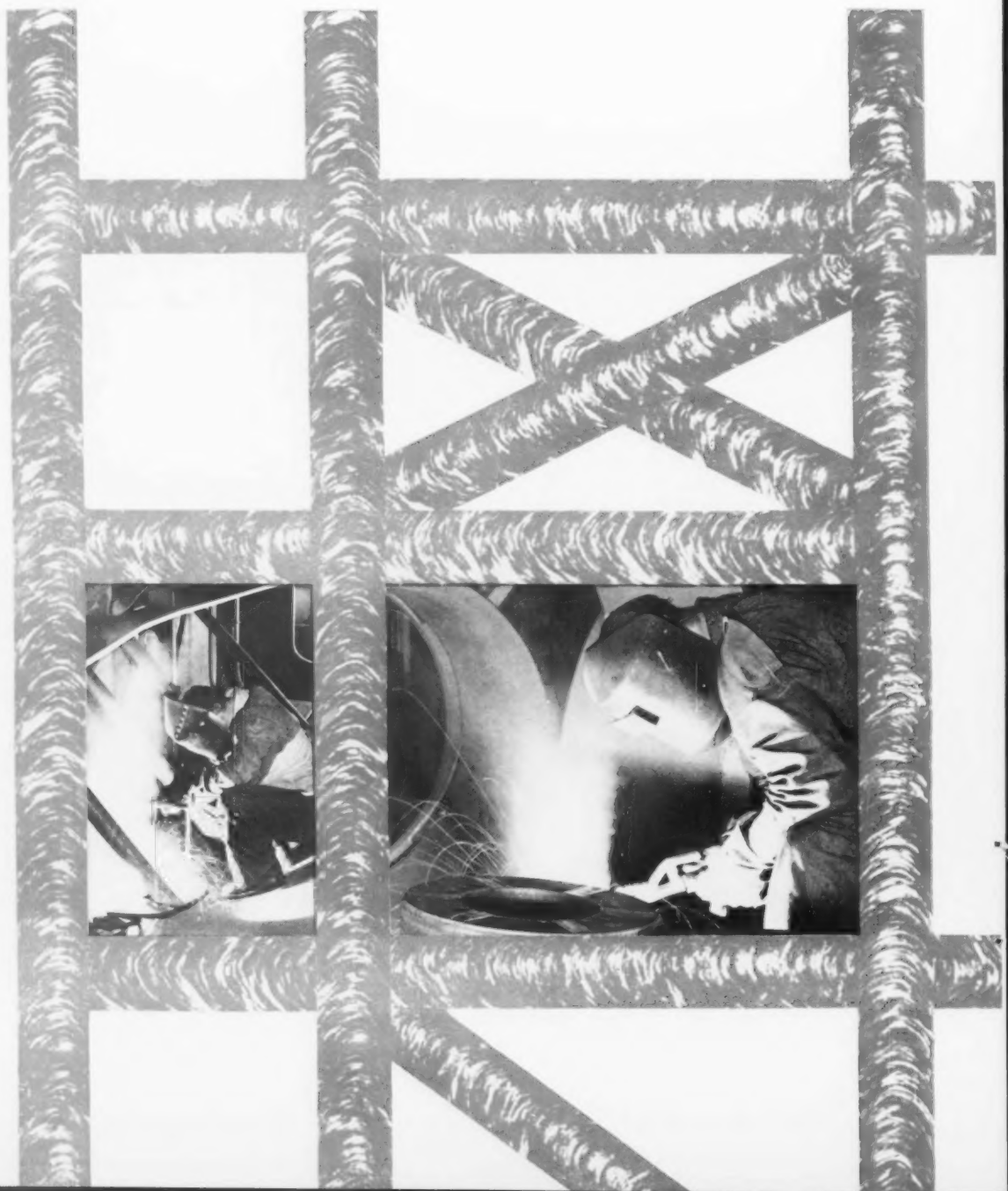
entirely new, proven design



NEBEL MODEL HXB 26/45 HEAVY DUTY EXTENSION BED GAP LATHE

new Westinghouse iron powder-coated electrodes enable

For superior, faster, easier welding, try the new ZIP-10 electrodes—latest advance from Westinghouse research and development. Key to the ZIP-10's performance: a special iron-powder coating that helps boost welding speed . . . makes welding easier because of more spray-type metal transfer . . . permits instant restrike whether the tip is hot or cold. With ZIP-10 iron powder-coated electrodes, welds are smooth, strong, continuous . . . free from breakdowns, pin holes, puffing craters. Undercuts are reduced. Slag is simple to remove. And the ZIP-10 produces outstanding welds regardless of the position in which they are held.



faster welding, instant restrike, hot or cold

Check your nearest franchised Westinghouse welding distributor about the new ZIP-10, one of a series of iron powder-coated electrodes . . . as well as the other electrodes in the complete Westinghouse line. Write Westinghouse Electric Corporation, Welding Department, 4454 Genesee Street, Buffalo 5, New York, for a pocket-sized electrode selector booklet.

J-10482

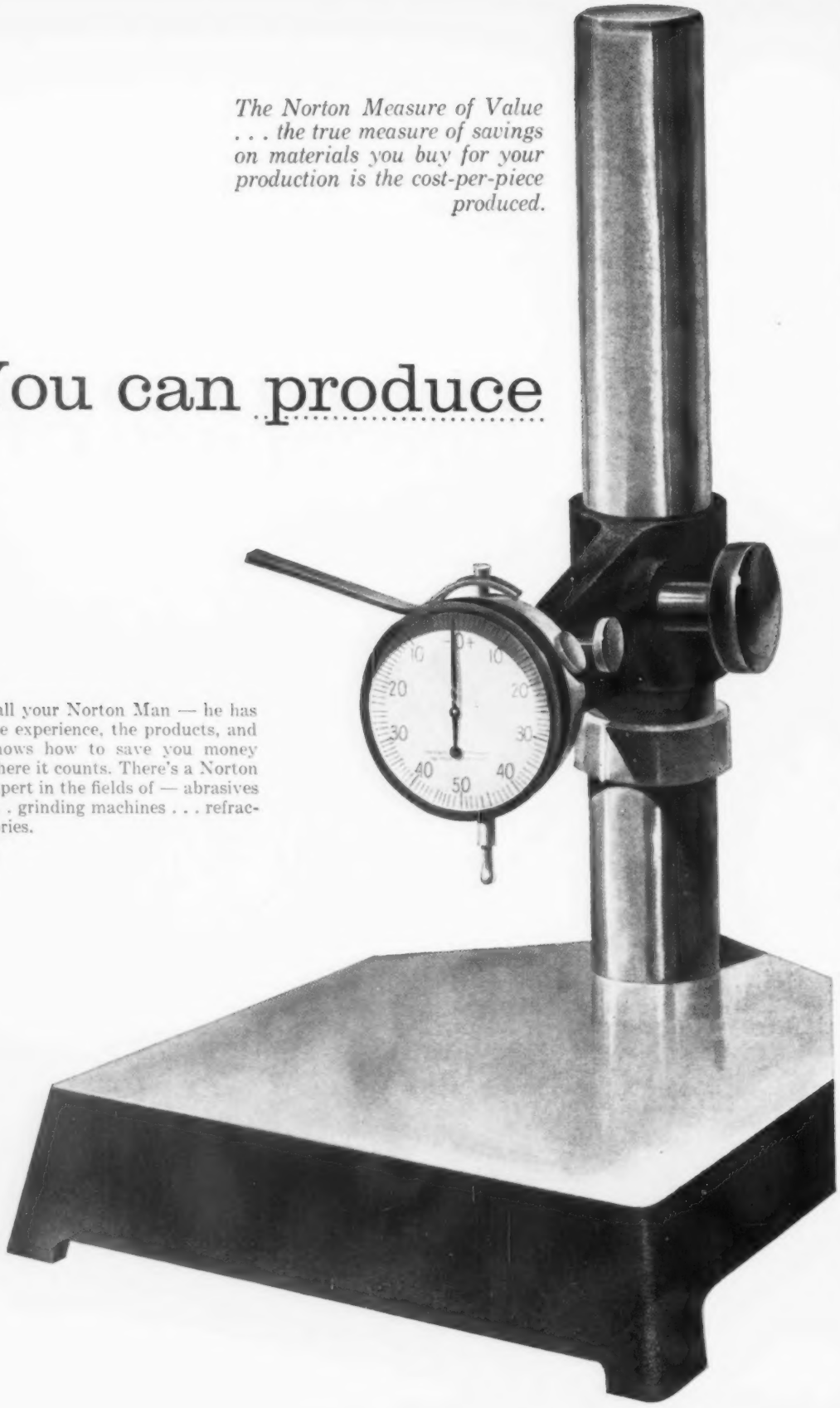
watch Westinghouse for new developments in welding

YOU CAN BE SURE...IF IT'S Westinghouse

The Norton Measure of Value . . . the true measure of savings on materials you buy for your production is the cost-per-piece produced.

You can produce

Call your Norton Man — he has the experience, the products, and knows how to save you money where it counts. There's a Norton expert in the fields of — abrasives . . . grinding machines . . . refractories.



greater savings than you can buy

You can't recognize a value by its price alone. This is true of all types of grinding wheels and has special significance in diamond wheels in view of their high initial cost.

The price tag on a diamond grinding wheel may appear to be a good "buy", but the real consideration should be what will you get for your money?

Diamond wheels less expensive than Norton may save you money on immediate cost. But if the lower cost wheels do not perform their jobs efficiently or cause production delays because of poor quality or wheel misapplication — the price you paid is too much.

The only accurate measure of the value of any grinding wheel is how much it produces for you per dollar cost — not merely how much you paid for it. Here is why Norton diamond grinding wheels are worth more to you . . .

Norton Company introduced all three diamond wheel bond types — does all its own sizing and checking of diamonds — duplicates wheel specifications with constant accuracy. Whether the diamonds you use in carbide grinding are mined or man-made, Norton gives you the most advanced research engineering and manufacturing facilities in the entire abrasive field. And you get this great scope of detailed knowledge on a personal basis — your Norton Man.

Your Norton Man starts his career by spending a minimum of one year in a carefully planned training course in the Norton plant and a comparable period of training in the field. The Norton Man has an average of 15 years' abrasive experience in addition to the specialized training. He is the most knowledgeable man in abrasives that you can consult. Make him your consulting abrasive engineer.

Ask him to make an Abrasive Requirement Study for you. This study lists the correct specifications for each abrasive job in your plant to assure you lowest cost-per-piece produced. He is also available for complete field testing on specific problems. For example . . .

Your Norton Man can increase production by pointing out ways for effective wheel usage. He has the widest selection of grinding wheels in the industry from which to select the best wheel for new product grinding operations and for improving your current grinding jobs — both at the lowest cost. And with Norton grinding wheels you can be sure of precise duplication order after order.

Norton offers true abrasive economy. Economy that pays off in lower cost-per-piece produced. Call your Norton Man. NORTON COMPANY, General Offices, Worcester 6, Mass.

W-1957

NORTON
ABRASIVES

75 years of... **Making better products...to make your products better**

The lady is a killer

Tough, fast and maneuverable, this is 60,000 tons of fighting ship. She's the Navy's newest and biggest jet-age aircraft carrier—the USS Independence.

Stowed inside her gargantuan hull are approximately 100 deadly jet fighters. Her armor-plated flight deck stretches 1,000 feet and laps an area of 4 acres. And, she's equipped with four catapults that can snap four jets howling into the air in thirty-eight seconds.

She's fast. The lady easily batters through foam-tipped waves at better than 30 knots. She's maneuverable. The Independence can follow a difficult zig-zag pattern and still cruise a distance of 600 miles in a twenty-four hour period.

To help transmit her great power from eight massive boilers, National Tube supplied over 16,000 feet of USS

National Seamless Pressure Tubes in both carbon and alloy steels for use in steam lines, as well as over 4,000 feet of Standard Pipe. In addition, National Tube also furnished a number of Seamless Steel Cylinders for air actuating systems and recharging breathing units.

For the past 80 years, National Tube has handled tough tubular installations in the fields of line pipe, pressure tubing, mechanical tubing and oil country tubular products. For assistance, write to National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

USS and National are registered trademarks

National Tube Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Export Company, New York

Your DoALL sawing specialist can help you get all the benefits of band machining

Laneko Engineering Company of Philadelphia has had wide experience in the contour cutting of metals with DoALL Band Saws. They used a DoALL Model V-36 and were well satisfied with the results. Then they added a new DoALL 26-3 and overnight graduated from band sawing to band machining.

In a typical test Bill Cole, sawing specialist of the DoALL Philadelphia Company, demonstrated that band machining could deliver tremendous savings in cutting time. The job, shown in the photo, consisted of contour cutting a block of AISI #4140 steel, 6½" x 6½" x 17". Formerly this took 10½ hours. With a power table replacing the old hand feed and following Bill Cole's recommendation of using a Demon* HSS Blade, the job was completed in just three hours—a 72% saving in time alone.

There are more than 200 DoALL Sawing Specialists from coast to coast experienced in cutting production costs with band machining. Call your DoALL Specialist today. His expert help—plus the help of the DoALL Research Laboratory—is free.

*Reg. T.M.—The DoALL Company

Large photo: Bill Cole of DoALL Philadelphia Company discussing proper feed, speed and blade with Mr. William Neff, Jr. (left) of Laneko Engineering Company. Small photo: both V-36 and new 26-3 DoALL Band Saws working side by side at Laneko.

SB-81

THIS IS A TYPICAL DoALL STORE

The DoALL Company, Des Plaines, Illinois

Call Your DoALL Service-Store

MACHINE TOOLS ..... CUTTING TOOLS ..... MEASURING INSTRUMENTS ..... SHOP SUPPLIES IN STOCK

consistent
quality
production
depends on...

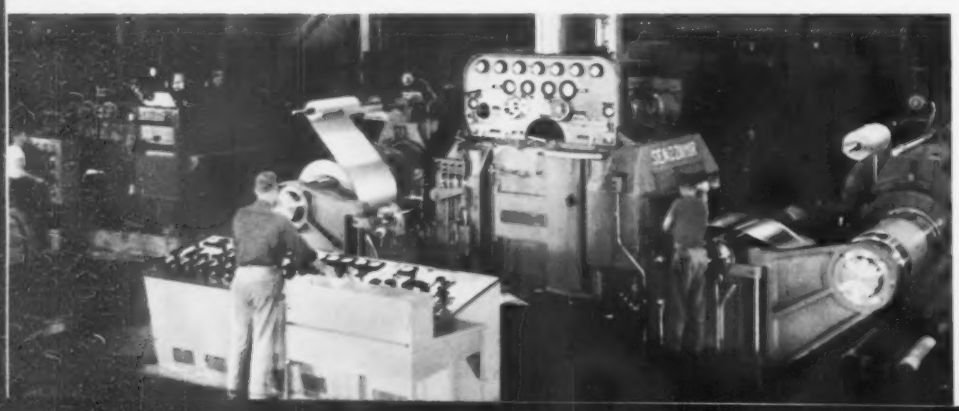
consistent quality

J&L STAINLESS

You can do more with Consistent Quality stainless steel because it increases yields by reducing rejects due to metal variations, eliminates production delays, and lowers tooling costs. In effect it insures your profit.

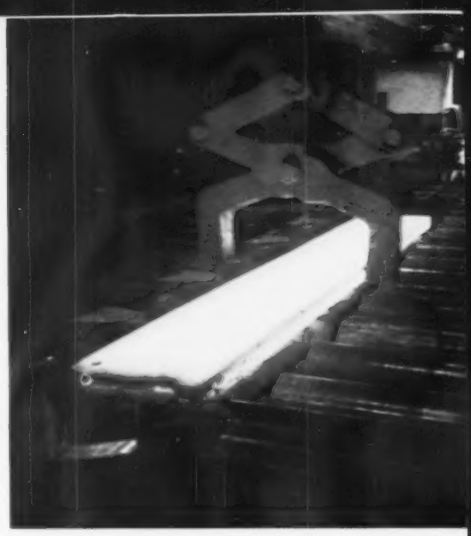
J&L Consistent Quality is the result of unique melting practices combined with the industry's most advanced facilities for producing stainless sheet, strip, bar and wire. J&L actually leads the industry in melt shop standards, the point where quality starts; and maintains that quality through every production operation.

To solve your production problems caused by quality variations in materials, contact your J&L distributor today.

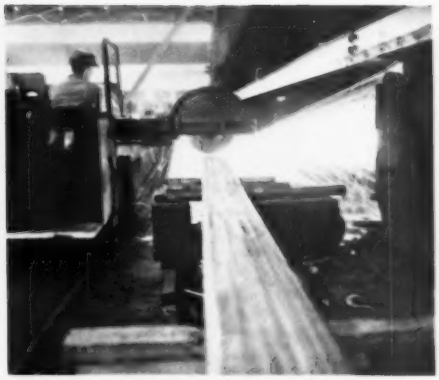


Sendzimir mill rolling assures precise gauge accuracy coil after coil.

Every phase of melting from the selection of scrap to the pouring of ingots is carefully controlled with laboratory precision by constant testing.

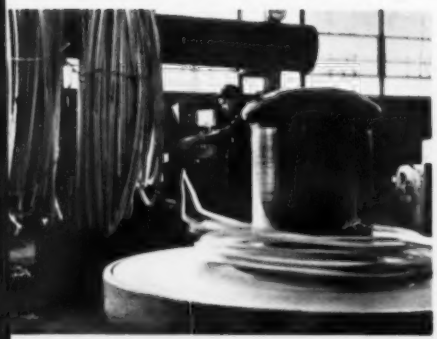


The quality of billets and slabs governs the quality of finished products.



Conditioning of slabs and billets to exacting standards assures flawless surface finishes.

stainless steel



Typical of all J&L equipment is the industry's most modern 4-block wire drawing unit.

The industry's largest bar inventories guarantee fast service. Comparable inventories of sheet and strip will assure speedy service for flat rolled products.

consistent quality stainless steel

is as near as your telephone

WESTERN UNION

call operator 25

(EFFECTIVE APRIL 1960)

Your J&L stainless steel distributor can serve you better *because J&L serves him better*, backing him with the full facilities of J&L's Stainless and Strip Division.

Your J&L distributor can reduce your costs by providing a complete range of pre-production services, and doing it economically! He can save you the capital investment required to maintain long term inventories; and can help you eliminate the costs of overhead connected with stocking, accounting, and the inevitable losses incurred through waste and obsolescence due to specification changes.

Technical assistance in solving production problems is also available from your J&L distributor. And when those problems are connected with an application using stainless steel, J&L's own staff of technical specialists will promptly answer your distributor's call for additional help.

Even when advanced research is required you can call on your J&L distributor in confidence. He will be happy to discuss your problems because he knows he is backed by one of the world's most respected teams of metallurgists—J&L's own staff in laboratories at Detroit and the famous Graham Research Laboratories at Pittsburgh.

Your J&L distributor is as near as your telephone. Call Western Union Operator 25 for the name of your J&L distributor of Consistent Quality stainless steel.

This manual is your guide to the selection of stainless steel sheet and strip. Write for your free copy.

Plants and Service Centers.
Los Angeles • Kenilworth (N. J.) • Youngstown • Louisville (Ohio) • Indianapolis • Detroit

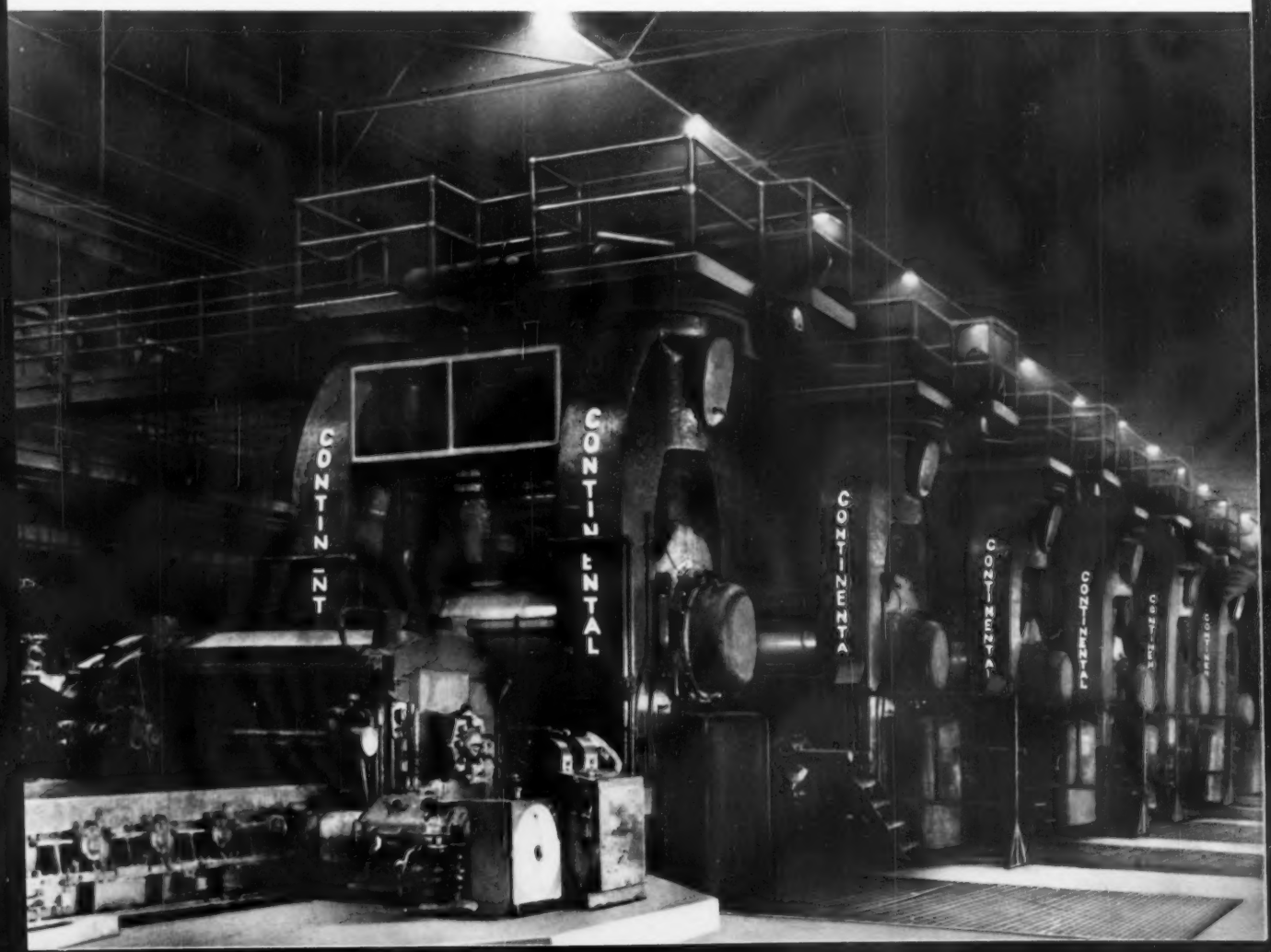
STAINLESS
SHEET • STRIP • BAR • WIRE

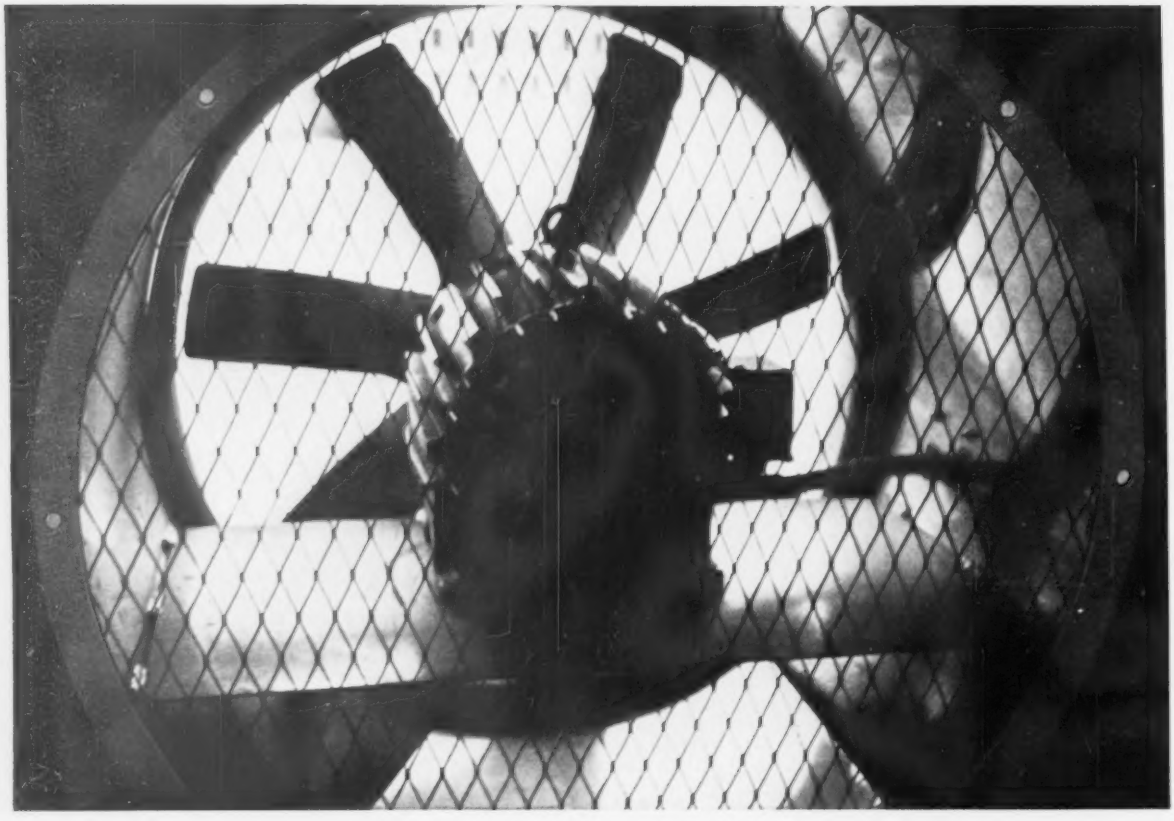
Jones & Laughlin Steel Corporation · STAINLESS and STRIP DIVISION · DETROIT 34

BLAW-KNOX

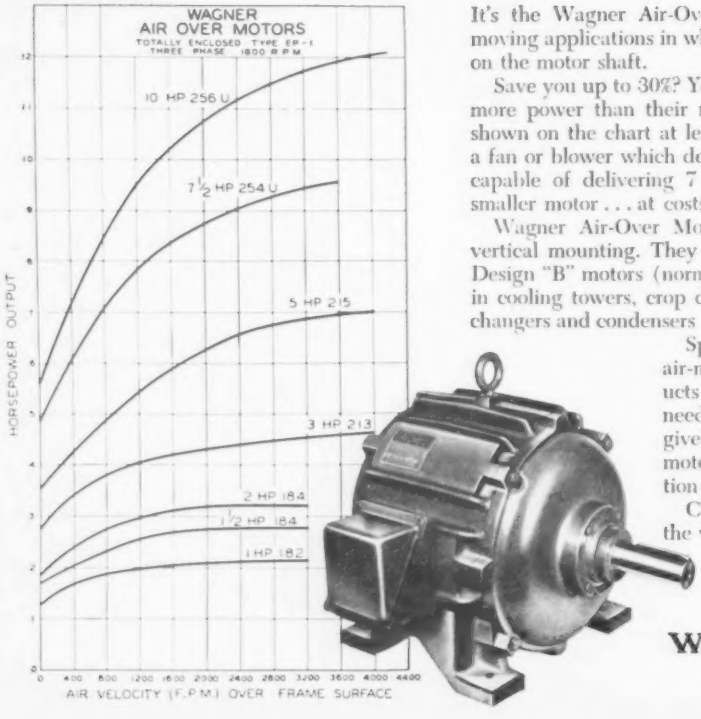
Blaw-Knox designs and builds a full range of continuous, semicontinuous, and single stand reversing hot strip mills. Other Blaw-Knox equipment for the metals industry includes complete rolling mill installations and auxiliary equipment for ferrous and non-ferrous metals, sheet and strip processing equipment, electrolytic tinning, annealing, and galvanizing lines, seamless pipe and tube mills, draw benches, and cold draw equipment, Blaw-Knox Medart cold finishing equipment, iron, alloy iron and steel rolls, carbon and alloy steel castings, fabricated steel plate or cast-weld design weldments, steel plant equipment, and heat and corrosion resisting alloy castings. Blaw-Knox Company. Foundry and Mill Machinery Division. Blaw-Knox Building, 300 Sixth Avenue, Pittsburgh 22, Pennsylvania.

80-inch continuous hot strip mill





This Wagner Motor can save you up to 30% in costs on air-moving equipment


WAGNER
AIR OVER MOTORS
TOTALLY ENCLOSED TYPE EP-I
THREE PHASE 1800 R P M
10 HP 256 U
7½ HP 254 U
5 HP 215
3 HP 213
2 HP 184
1½ HP 184
1 HP 182
HORSEPOWER OUTPUT
0 400 800 1200 1600 2000 2400 2800 3200 3600 4000 4400
AIR VELOCITY (F.P.M.) OVER FRAME SURFACE

It's the Wagner Air-Over Motor . . . *specifically* designed for air-moving applications in which a propeller or axial flow fan is mounted on the motor shaft.

Save you up to 30%? Yes, for Wagner Air-Over Motors can deliver more power than their rated horsepower output. For example, as shown on the chart at left, a 5 horsepower rated motor installed in a fan or blower which delivers about 4,000 feet of air per minute is capable of delivering 7 horsepower. You get more work from a smaller motor . . . at costs up to 30% less.

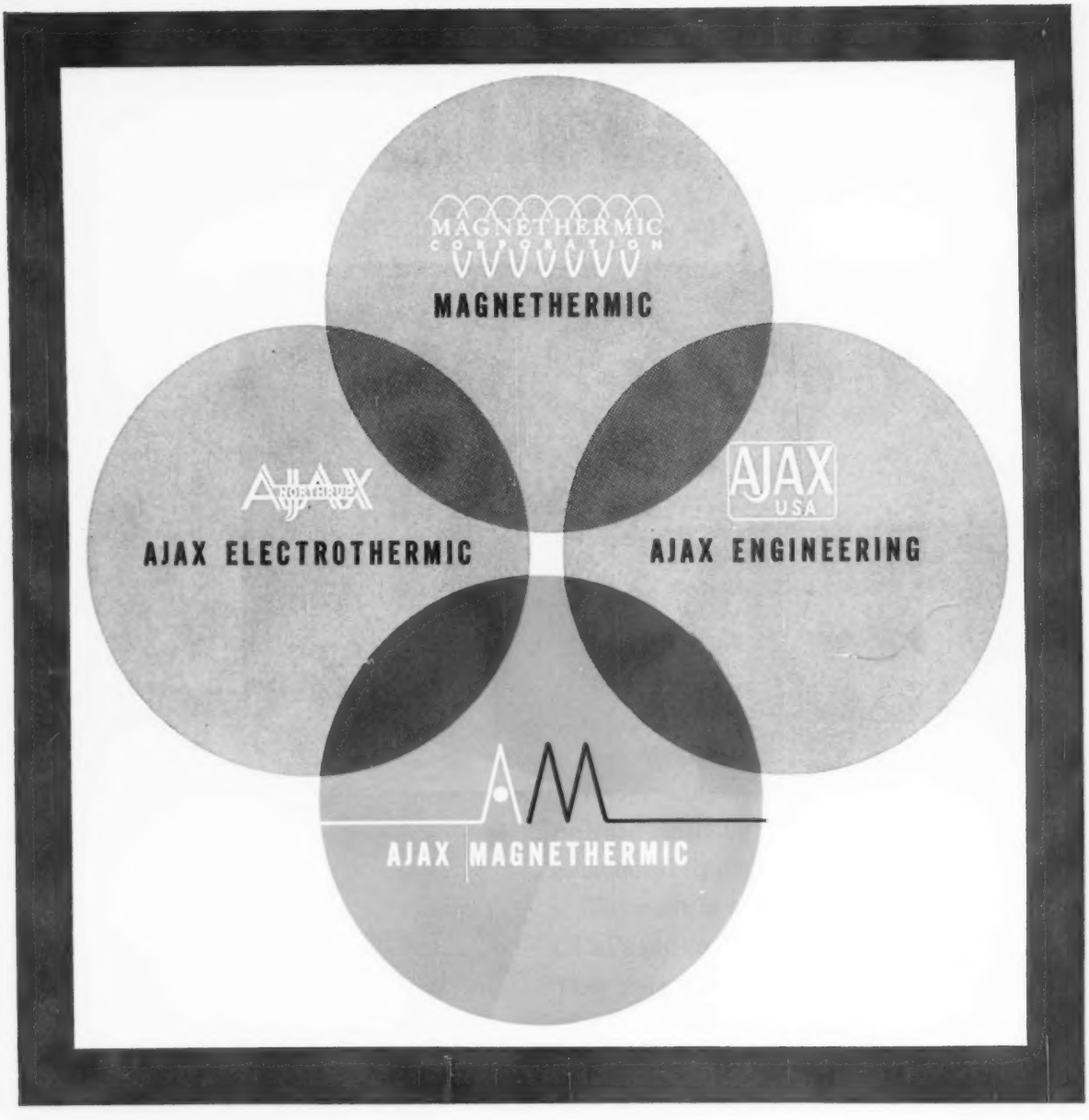
Wagner Air-Over Motors are suitable for either horizontal or vertical mounting. They are totally-enclosed, nonventilated NEMA Design "B" motors (normal torque—normal slip). You can use them in cooling towers, crop dryers, exhaust systems, air-cooled heat exchangers and condensers . . . any air-over fan and blower application.

Specify Wagner Air-Over Motors for all your air-moving equipment applications. Your products will operate at peak efficiency for years, need less service and fewer repairs. And, you'll give your customers equipment powered by motors they know . . . motors that have a reputation for long, dependable service.

Call your Wagner Sales Engineer now . . . get the whole Wagner Air-Over Motor story. There are Wagner Branches in 32 principal cities across the country.

Wagner Electric Corporation
6403 Plymouth Ave., St. Louis 33, Mo.

WM60-13



THE NEW NAME WITH THE FAMILIAR RING!

This new name combines three old names of the Induction Heating business—Ajax Engineering, pioneer in 60-cycle melting; Ajax Electrothermic, pioneer in high-frequency melting; and Magnethermic, pioneer in Induction Billet Heating.
This old "new" company now offers the most complete line of Induction Heating equipment, the most experienced staff and the largest facilities of any manufacturer of Induction Heating equipment. This combination of experience, facilities and product line permits an unbiased evaluation of your heating or melting application.

"induction heating is our only business"

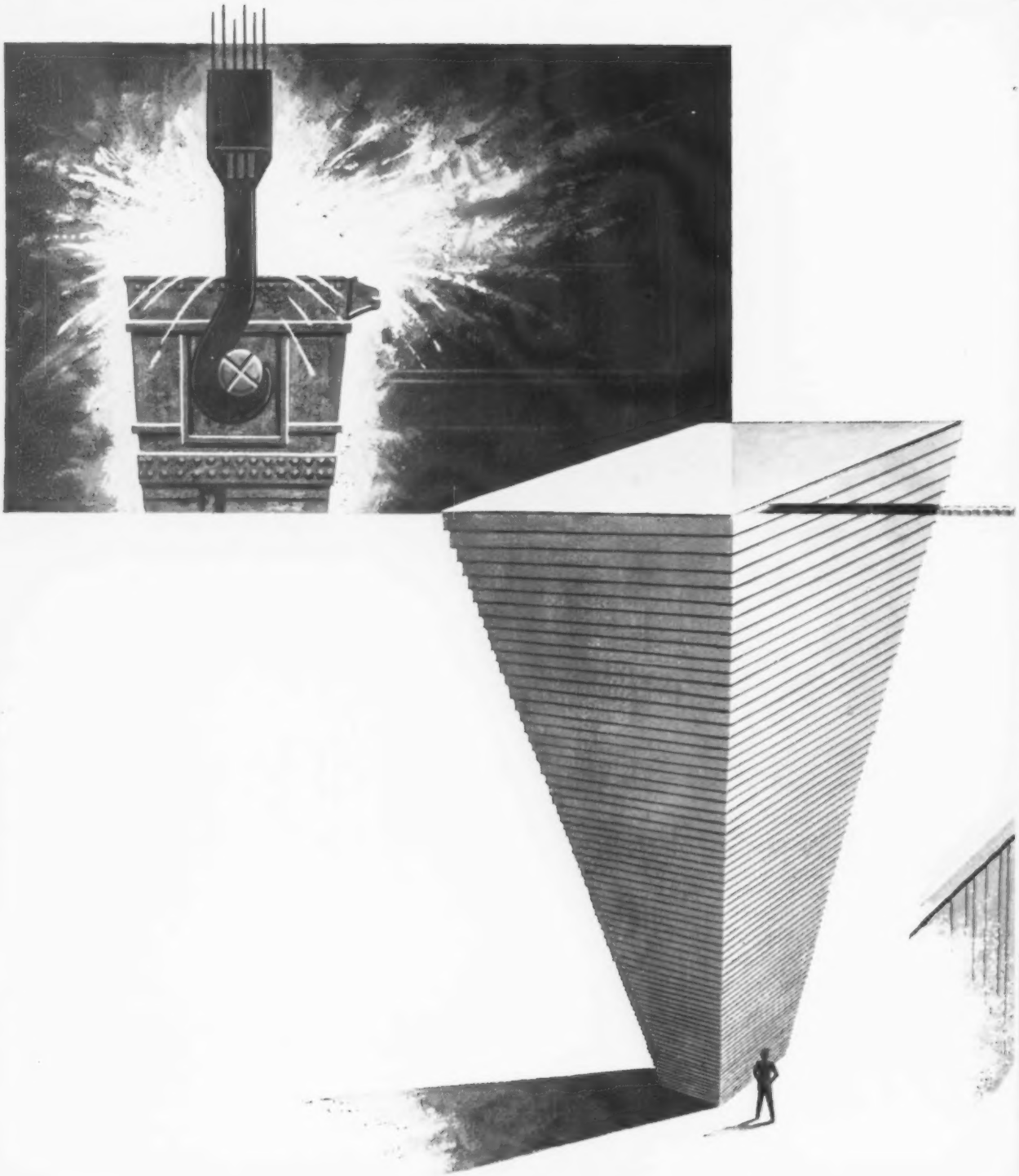
AJAX Magnethermic CORPORATION

GENERAL OFFICES
P. O. BOX 839
Youngstown 1, Ohio

TRENTON DIVISION
930 Lower Ferry Road
Trenton 5, New Jersey

YOUNGSTOWN DIVISION
3990 Simon Road
Youngstown 1, Ohio

WHAT IS CF&I-

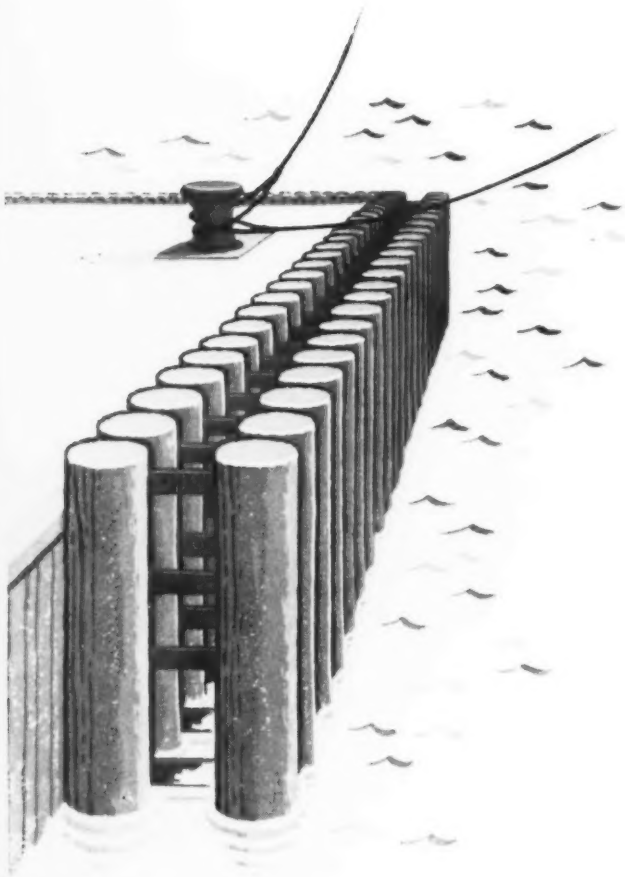


CLAYMONT?

CF&I-Claymont is the heart of a volcano...

a mountain of plates...

a dock on tidewater



Claymont is a vital arm of CF&I, one of the nation's leading steel companies. Claymont is liquid steel, hot as the heart of a volcano, flowing from an open hearth. It is plateau after plateau of steel plates poised for rapid delivery. Claymont is water, highway and railroad shipping facilities that assure rapid, economical shipment of all Claymont products.

Claymont is an integrated steel mill. Here, CF&I's pig iron is converted into quality steel. Then the steel undergoes the constant scrutiny of quality control men as it is rolled into plates and shaped into a wide variety of plate products. The result: built-in dependability which is characteristic of all CF&I steel products.

CF&I-Claymont is also a sales-service force whose job is to serve you properly and promptly, providing you with technical assistance whenever needed.

7494

CLAYMONT STEEL PRODUCTS

THE COLORADO FUEL AND IRON CORPORATION

DENVER • OAKLAND • NEW YORK

sales offices in all key cities

CF&I STEEL

ALLIS-CHALMERS

Allis-Chalmers equipment for progressive mills: **1.** motor, **2.** control, **3.** mercury-arc and semi-conductor rectifiers, **4.** furnace transformers

The right start for better end results

begins with Allis-Chalmers electrical equipment coordination

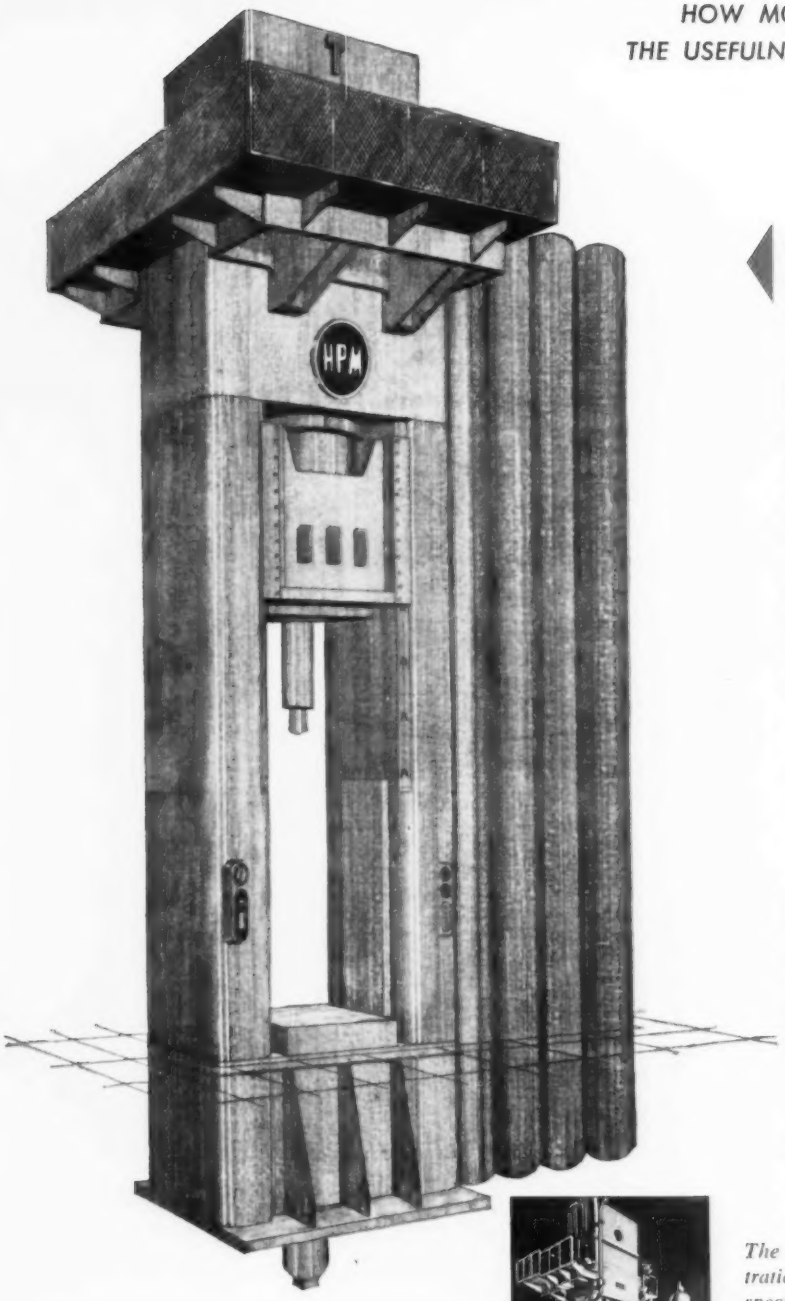
Proper application . . . efficient use of electric power — these are essential ingredients to peak mill output. No single piece of equipment in a process line can guarantee this result, for its performance depends on the accurate function of other devices.

Allis-Chalmers equipment is matched to mill standards for maximum performance. Blooming mills, hot-strip mills — wherever electric power is used, Allis-Chalmers coordinated engineering is the key to higher efficiencies . . . increased yield . . . a finished product of the highest quality.

Allis-Chalmers is helping steel mills with their new plant and modernization programs. Many have improved output and product quality without the cost of major plant alterations.

There's an Allis-Chalmers steel mill specialist near you. *Call him direct, or write* ***Allis-Chalmers,*** *Industrial Equipment Division, Milwaukee 1, Wis.* A-1272

HOW MODIFIED H-P-M STANDARDS TRIPLE THE USEFULNESS OF METALWORKING PRESSES



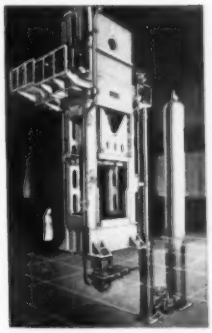
TOO CUSTOM TO CATALOG

But Just Right For The Job

The sketch at left emanated from the proposal engineering department at H-P-M and a few months later the press, shown in the small photo below, became a reality. It was designed for a combination of hot forging and cold extrusion and incorporated enough unusual press requirements to qualify as special. This 1000-ton H-P-M has a bed area of 66″ x 60″, 98″ of daylight and a 60″ stroke. It is equipped with a 150-ton hydraulic ejector cylinder with a 24″ stroke. The main ram travels at a speed of 1000 ipm for closing and return with a pressing speed of 600 ipm. The accumulator system shown at right supplies a high speed pressure stroke of 19″ in length.

Completely special as normal requirements go but a pressure processing problem that's a typical standard for H-P-M engineers. Both the engineering ability and the facilities to manufacture such huge equipment make H-P-M your best source for metalworking machines of the future.

You're under no obligation to investigate the service that H-P-M has been performing for years — special hydraulic design for the metalworking industry. Write or call for complete details.



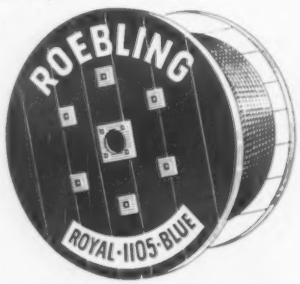
The design sketch illustrated is a perspective illustration that accompanies each H-P-M proposal for special machine recommendations. These portfolios contain complete job recommendations, layout drawings, press specifications, delivery and price. It's a service that is backed by thousands of engineering hours from our experienced staff of hydraulic specialists.

THE HYDRAULIC PRESS MANUFACTURING COMPANY
A Division of Koehring Company • Mount Gilead, Ohio, U.S.A.

HPM

H71

When you're talking about a $162,000 dipper shovel, you've got to talk about the best rope for it



Talking about or working with, the same thing applies. Anything below Royal Blue's performance level is simply unrealistic. Like looking for a cut-price brain surgeon.

Even at $162,000, the cost of wire rope is important. That's why so-so ropes can cost you more in the long run, because so-so ropes are *short run*. Royal Blue, on the other hand, is built by America's oldest manufacturer of wire rope to last, to do the job without a whimper. Here's why.

Royal Blue is made from the toughest rope wire ever made—Type 1105—extra high-strength improved plow steel. This pedigree gives to the rope qualities that you can't find in any other rope: exceptional resistance to shock, abrasion, fatigue and impact. Add to these a flexibility that age cannot wither nor hustling fade and you've got a collection of characteristics that make Royal Blue the strongest rope you've ever used.

A $162,000 Dipper Shovel deserves the best and your Roebling Distributor has it . . . Royal Blue. For information, write to Roebling's Wire Rope Division, Trenton 2, N. J.

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if your twin problems are

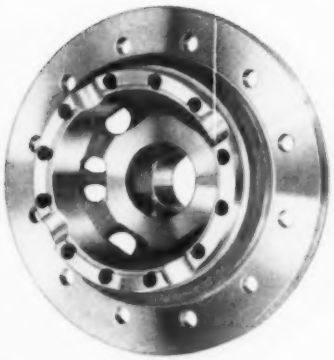
product improvement

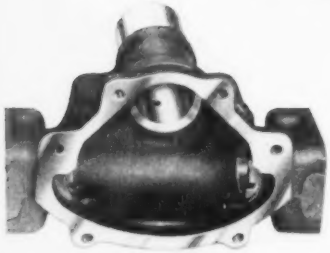
and

cost reduction

NATIONAL HTM CASTINGS

are the answer





HTM is strength . . . toughness . . . wear and fatigue resistance . . . non-seizing. HTM is higher machinability than B1112 steel . . . it's closer as-cast tolerances that can reduce or wipe out machining operations.

If you're reappraising your product from a competitive point of view . . . if you're looking for production economies—look into HTM castings. Yes, HTM is many things—and it's just made to order for many mass-produced products just like yours.

A-115IA

NATIONAL MALLEABLE and STEEL **CASTINGS COMPANY**

Established 1868 *Cleveland 6, Ohio*

HTM (Pearlitic Malleable) is many things—and they all add up to a *better product at lower finished cost.*

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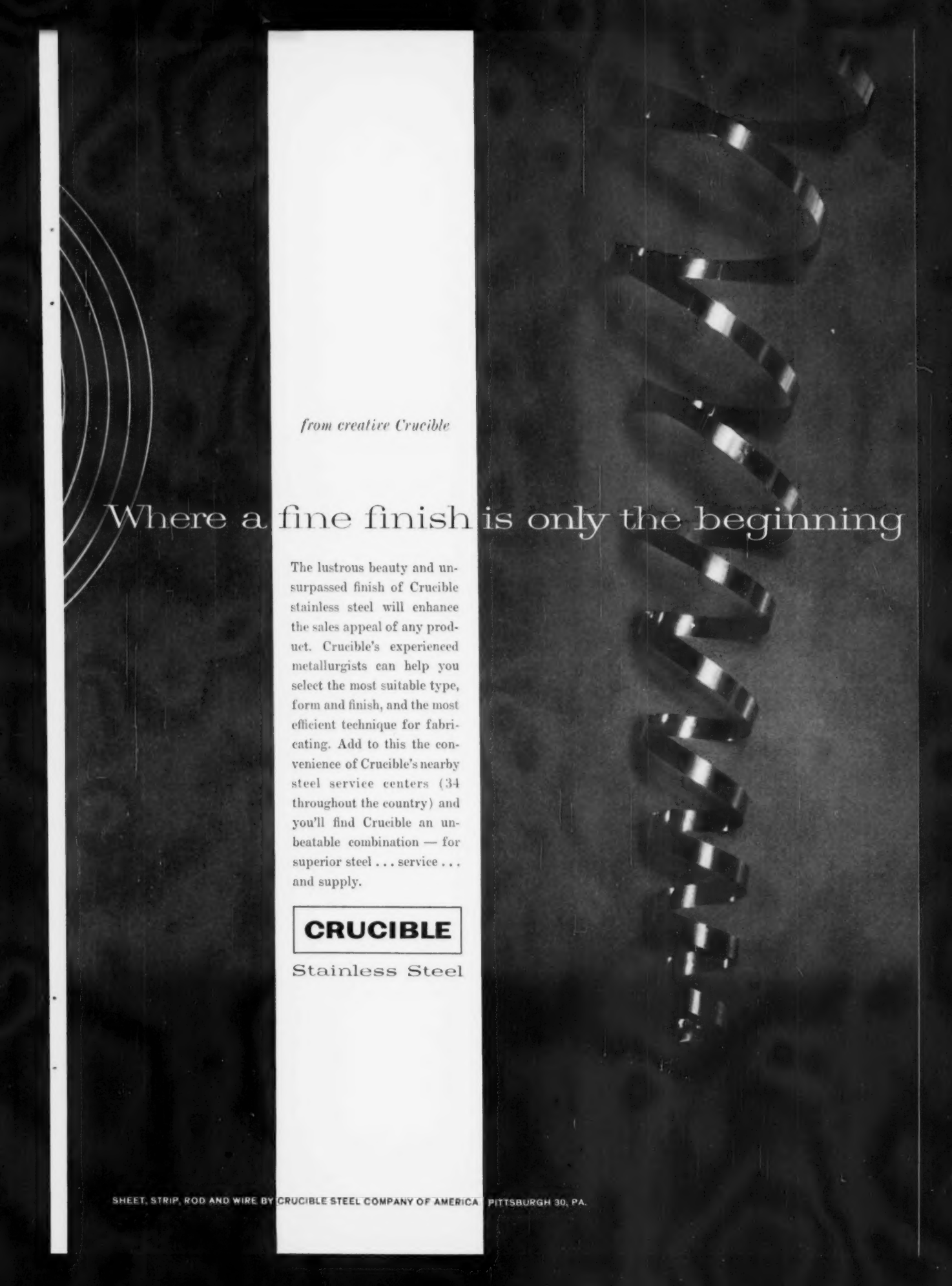
The nation's largest independent producer of malleable and pearlitic malleable

GOWN BY FON TAYNE; STAINLESS



from creative Crucible

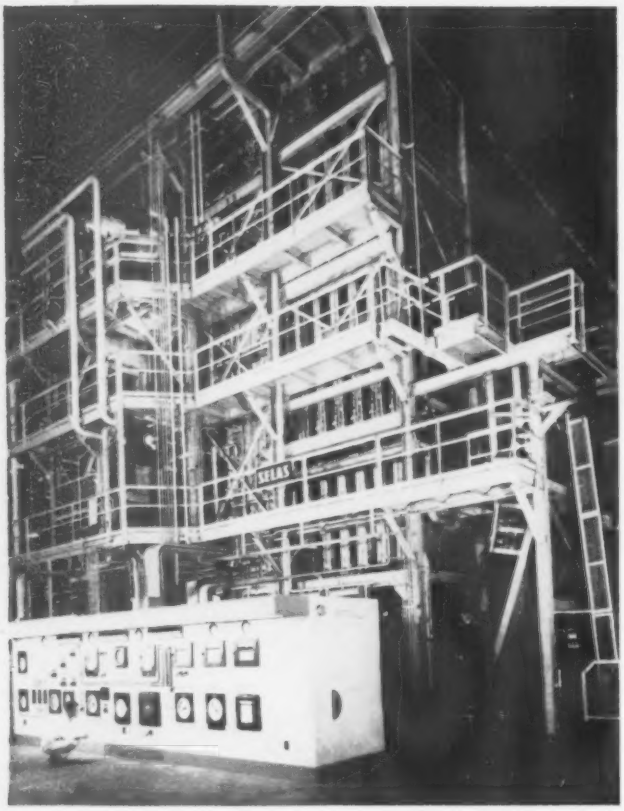
Where a fine finish is only the beginning

The lustrous beauty and unsurpassed finish of Crucible stainless steel will enhance the sales appeal of any product. Crucible's experienced metallurgists can help you select the most suitable type, form and finish, and the most efficient technique for fabricating. Add to this the convenience of Crucible's nearby steel service centers (34 throughout the country) and you'll find Crucible an unbeatable combination — for superior steel . . . service . . . and supply.

CRUCIBLE

Stainless Steel

SHEET, STRIP, ROD AND WIRE BY CRUCIBLE STEEL COMPANY OF AMERICA PITTSBURGH 30, PA.



Here's how the Steel Industry

STRIP is continuously bright-annealed in this single-pass, direct-fired furnace. Designed for fast, uniform heating, Gradiation strip lines are compact, easy to install, simple to operate, economical to maintain. This concept of strip heating is also used for annealing of stainless steel, tin reflow, galvanizing-annealing, blueing, preheat for galvanizing and annealing.

The versatility and adaptability of Selas Gradiation® heat processing—throughout the steel industry—is demonstrated by the diversity of applications shown in the accompanying photographs.

Gradiation is a concept and technique of heat processing which coordinates fast, controlled heating with the nature of the workpiece . . considering its composition, size, shape, heat transfer characteristics and physical properties . . to develop desired product quality, in minimum time, with maximum efficiency, and with the use of automated and compact equipment.

Designed and custom-built to meet your specific heat processing needs . . for hot working . . galvanizing . . tinning . . heat treating heavy sections and special shapes . . Gradiation equipment contributes production economy, high production rates, ease of handling.

At your convenience . . without cost or obligation to you . . a Selas field engineer would welcome the opportunity to survey your needs. For this personal service—or for a copy of our new Bulletin "Selas Gradiation Heating in the Steel Mill"—write to Mr. R. E. Buckholdt, Mgr. Furnace Division, Selas Corporation of America, 13 Dreshertown Road, Dresher, Pa.

Gradiation and Duradiant are registered trade names of Selas Corporation of America

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SELAS CORPORATION OF AMERICA
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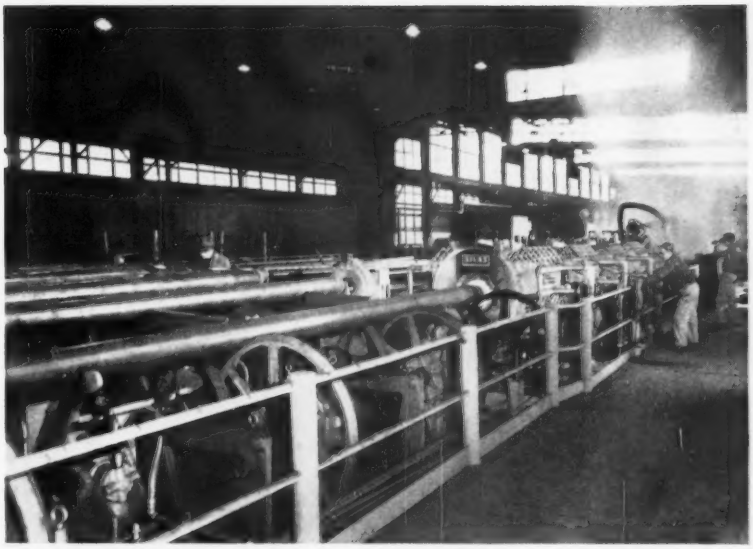
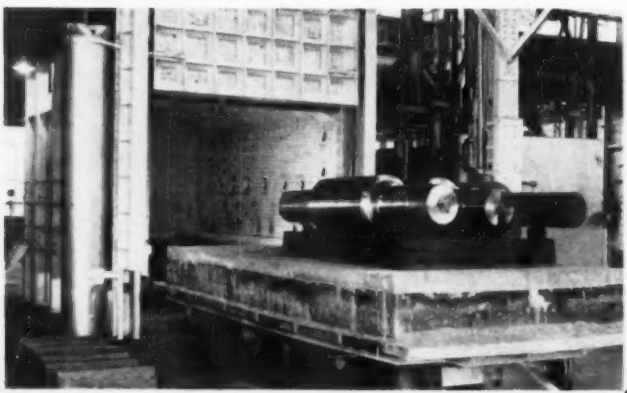
HEAT AND FLUID PROCESSING ENGINEERS development • design • construction

is your reward

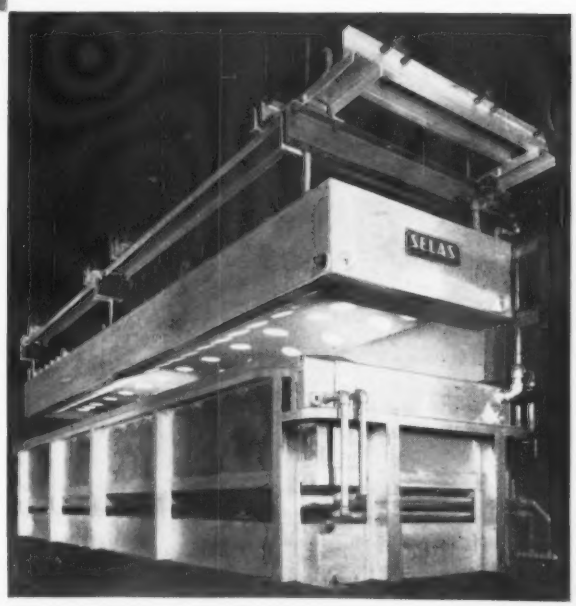


SEAMLESS TUBING is hardened and tempered in this Selas barrel-furnace line to produce oil-well casing for the petroleum industry. The pipe is heated to 1600°F in five barrel furnaces, quenched by an annular water spray unit, then tempered in succeeding five barrel furnaces. Rotation of the pipe during its forward motion (during heating and cooling) assures uniformity of metallurgical properties and straightness. Pipe 5 in. to 9⅝ in. O.D. is handled in this completely automated line.

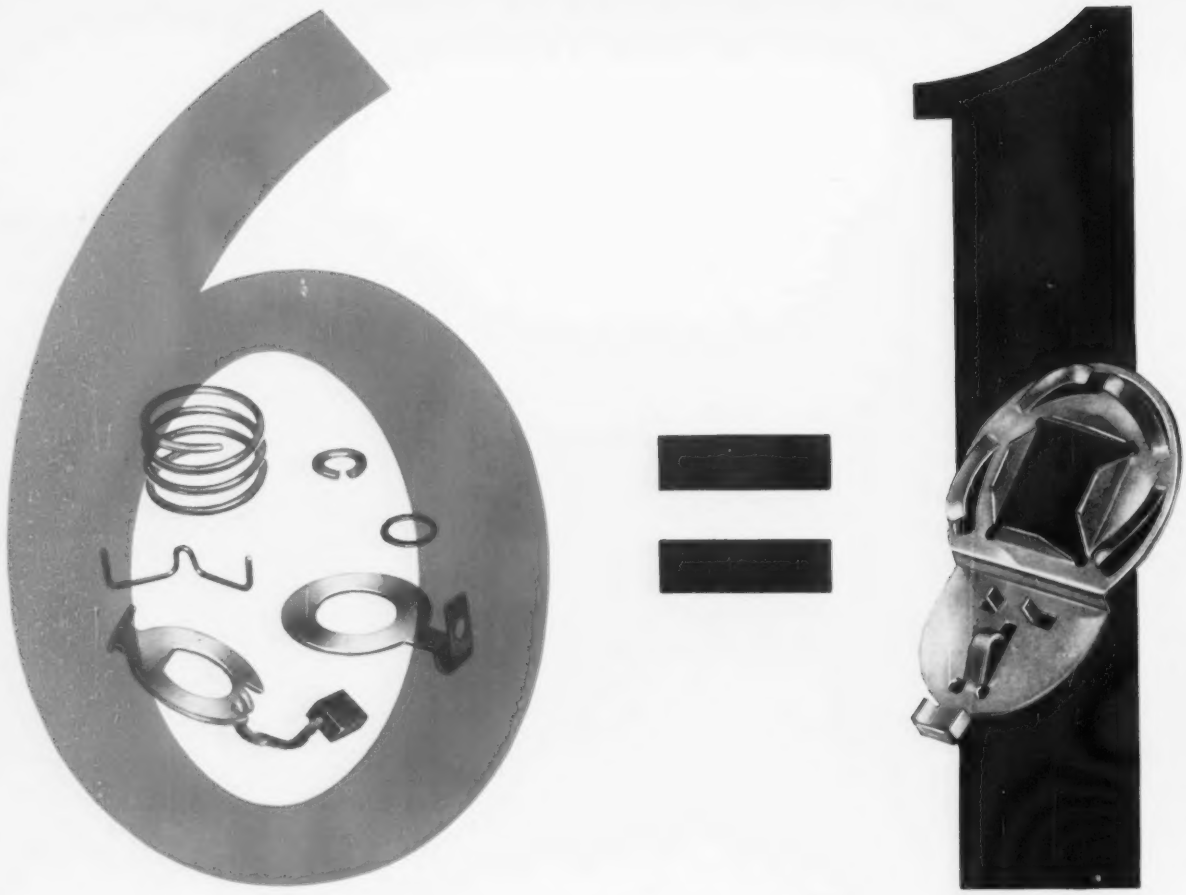
uses SELAS Heat Processing



CAST-STEEL ROLLS and other alloy steel castings are annealed in this Gradiation-fired car-bottom furnace, at Ohio Steel Foundry, Lima, Ohio. Preciseness of control and uniformity of heating enables prescribed time-temperature cycles — required in processing the sensitive cast-steel structures — to be followed.



TUBE-ENDS are heated for upsetting (for subsequent threading) in specially-designed Selas slot-type furnaces. As each tube-end is fast heated to upsetting temperature, the tubing automatically moves down the handling table to the upsetting machine. The direct-fired Duradiant® gas burners are patterned to assure temperature uniformity within a controlled section of each tube-end.



with re-design 'rithmetic

One flat spring now does the work previously required of the six parts shown—and greatly simplifies assembly, too. This single multi-purpose spring (a) holds a carbon brush in a rheostat, (b) applies pressure on the wire windings, (c) provides friction detent action, (d) acts as a retainer on the rotating shaft.

How did this come about? The maker of the rheostat undertook a complete redesign analysis, called in an A.S.C. Spring Engineer when it concerned the spring.

Early consultation with A.S.C. springmakers in new or redesign projects gives greater range to plans, safeguards against high production costs. Our booklet, "Designing Springs for Performance," may help you. Write for your copy.

8902

Associated Spring Corporation General Offices: Bristol, Connecticut

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The ideal crane for your pre-engineered steel frame buildings.

Here's a crane that's tailor-made for the popular pre-engineered, steel frame building. Overhang at both ends of the bridge beam permits installation for maximum hook coverage with greatest height under the hook in this type of building. And, "Borg-Warner QUALITY-RATED" is your assurance of maximum performance, reliability and long life.

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The Industry's Most Complete and Most Flexible Mill Service For Cold Finished Steel Bars

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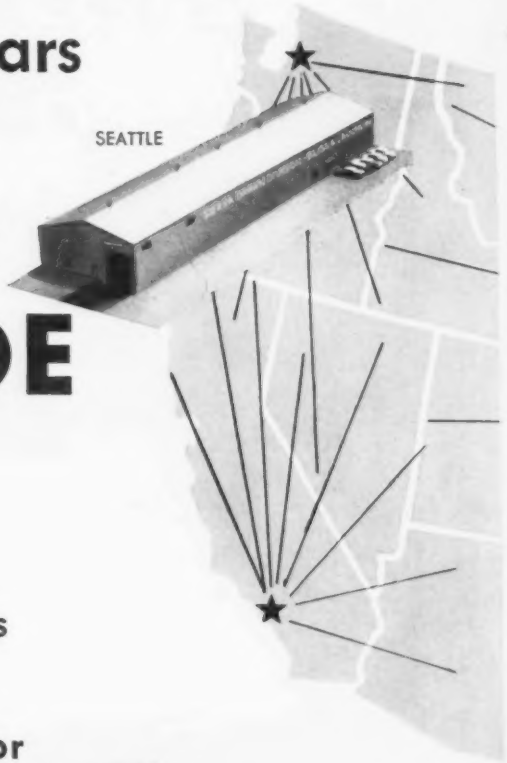


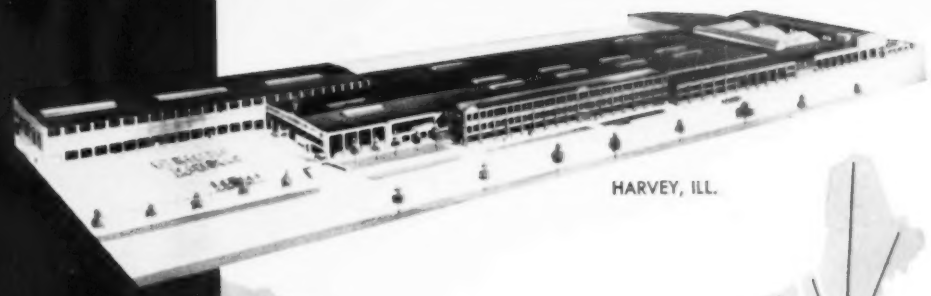
BLISS & LAUGHLIN'S new SIERRA DRAWN DIVISION adds two West Coast mills to provide a full range of cold finished steel bars for all metalworking areas

The merger of Sierra Drawn Steel Corp.'s Los Angeles and Seattle mills with Bliss & Laughlin's four midwestern and eastern mills expands Bliss & Laughlin's fast, flexible, specialized production facilities all across America.

Sierra Drawn joins Bliss & Laughlin to bring a complete line of cold finished steel bars to the growing West Coast metalworking industry. Bliss & Laughlin looks to its new Sierra Drawn Division as a respected partner in enlarging the company's present West Coast services.

This extension of Bliss & Laughlin's production skills across the nation is another step in company's seven decades of leadership in providing the industry's *most complete* and *most flexible* mill service.

Completes Another Step In Bliss & Laughlin's Nearly 70 Years of Leadership In Production Methods, Research and Service



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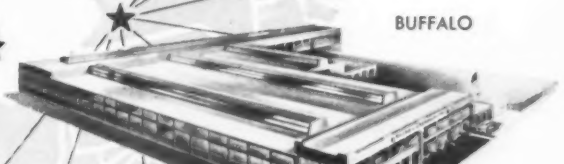

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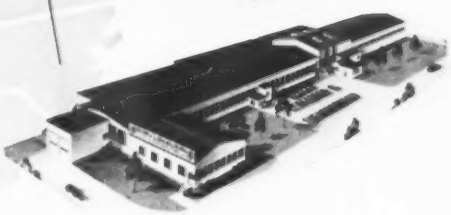

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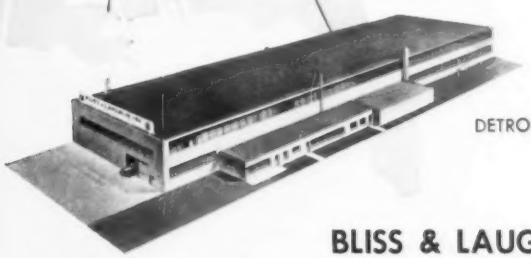

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VCA has a really complete line of quality chromium products, including briquettes. That's why your VCA man can give you an impartial recommendation. No axe to grind, because your satisfaction is his satisfaction. For the alloy that will give you the best possible results at the lowest possible final cost, call your VCA District Office soon! Vanadium Corporation of America, 420 Lexington Avenue, New York 17, New York • Chicago • Cleveland • Detroit • Pittsburgh

Be sure to see us at the AIME Open Hearth Meeting, Palmer House, Chicago, April 4—6.

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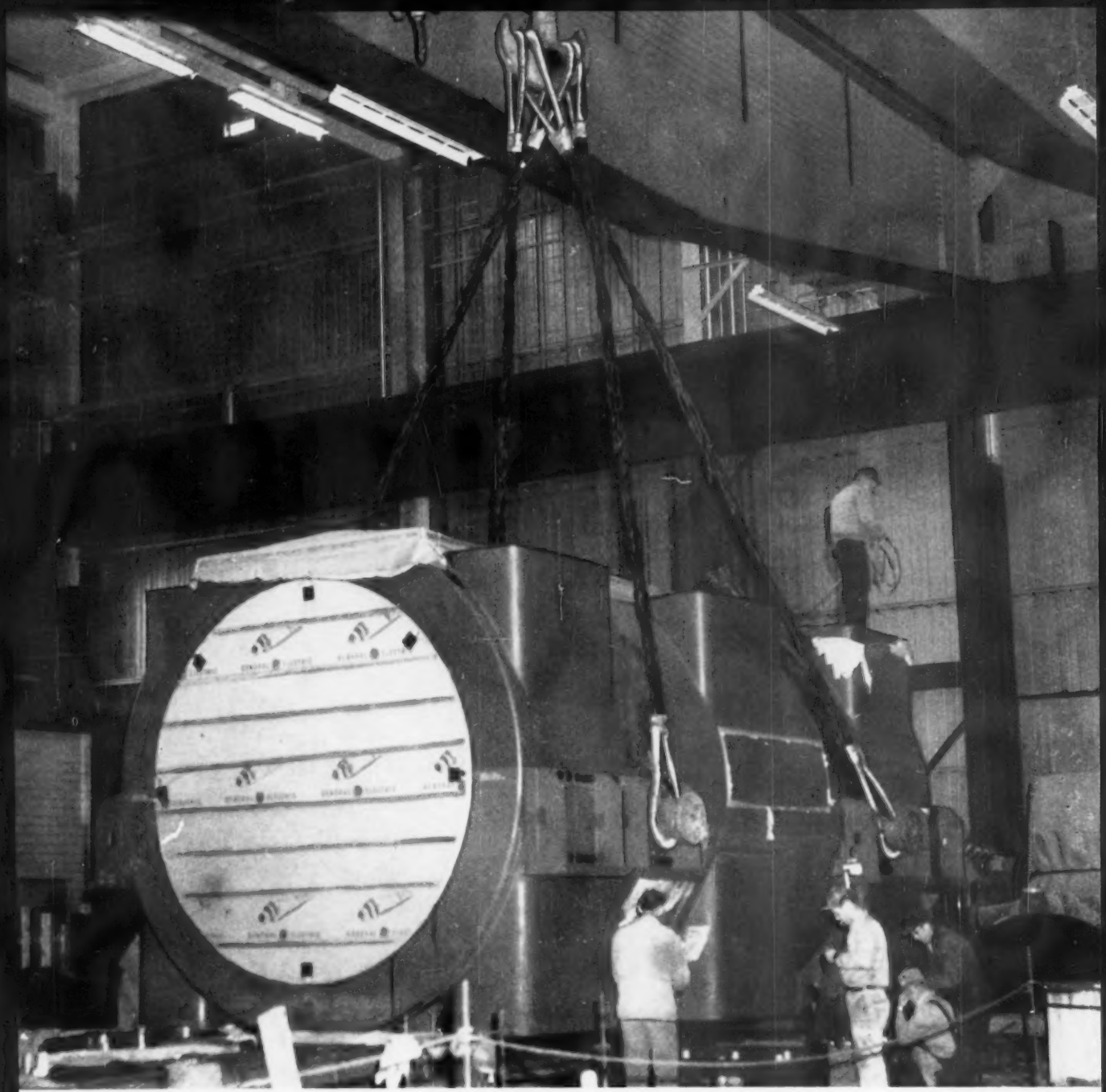

3/4 MILLION DOLLAR LIFT!

379,000 pounds of extremely valuable equipment are shown being lowered onto a base at the Central Illinois Light Company's new plant near Peoria, Illinois. This is a generator stator capable of producing 125,000 KW of electricity and is the largest unit on the CILCO system.

Contractor on the job was J. F. Pritchard and Company, who entrusted the ¾ million dollar lift to B & B Braided Safety Slings. As expected, the slings were worthy of that trust. The job was performed without a hitch and the stator was installed in perfect condition.

When lives—time—and valuable equipment are at stake, entrust your heavy lifts to Yellow Strand Braided Safety Slings. They live up to expectations! Broderick & Bascom Rope Co., 4203 Union Blvd., St. Louis 15, Mo.

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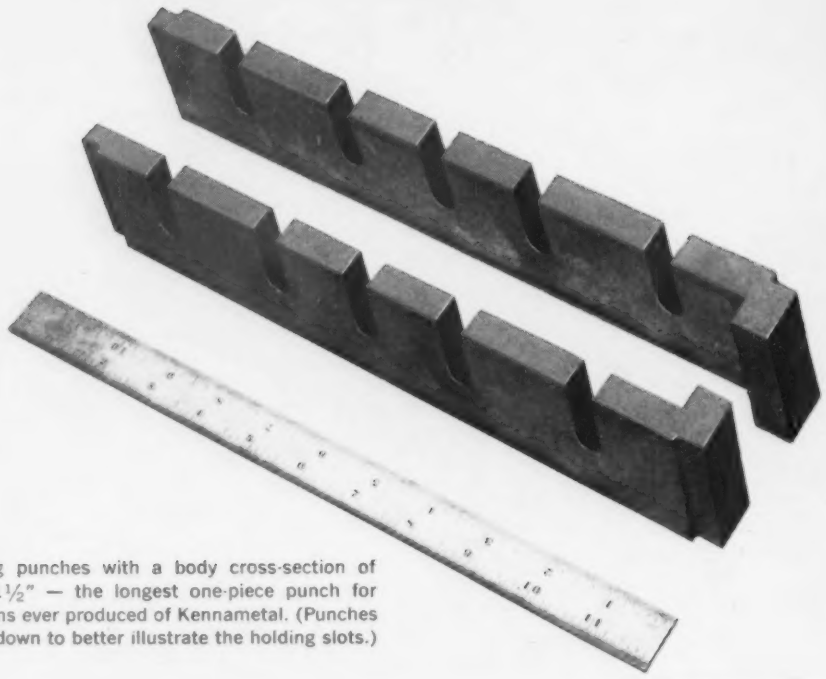


One-piece blanking punches with a body cross-section of 1½" x 2½" x 11½" — the longest one-piece punch for blanking laminations ever produced of Kennametal. (Punches are shown upside down to better illustrate the holding slots.)

Longest KENNAMETAL* one-piece blanking punch makes 700,000 hits between grinds

When the product design engineers of Advance Transformer Company required silicon steel laminations $12\frac{3}{8}$" long, it became apparent that the carbide blanking punches should be of one-piece construction. This presented a problem, as punches of this size would ordinarily be made in two or three sections.

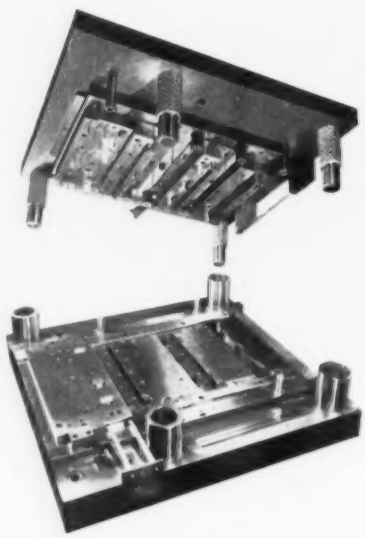
After consulting with a number of carbide manufacturers, Kennametal Inc. was selected to make the molded carbide sections. Everede Tool Company, Chicago, was chosen to construct the die. Within seven weeks the die was in operation . . . setting top-rate performance records in producing large laminations for fluorescent lamp ballasts.

Material laminated	Silicon Steel
Die life in inches	.750
Die life in grinds	75
Amount removed per grind in inches	.010
Number of hits between grinds	700,000
Total estimated hits for full life of die inserts	52,500,000

This performance is due largely to the *one-piece* construction of the Kennametal blanking punches, as they maintain proper size of laminations during life of punch; provide longer punch life; permit longer runs between regrindings; reduce downtime normally required to clean and realign punch sections; eliminate possibility of producing jagged laminations—which might occur through any separation of section joints of multiple-section punches.

The exceptional characteristics of Kennametal hard carbide alloys, plus our engineering service, have provided the solutions to many problems . . . in many fields. They could prove equally helpful to you on some project. For further information contact your Kennametal Representative or write KENNAMETAL INC., Latrobe, Pa.

*Trademark



In addition to blanking punches, Kennametal parts include 3 slotting and 11 piercing punches, 2 scrap cutting inserts, and all die cutting sections.

97262

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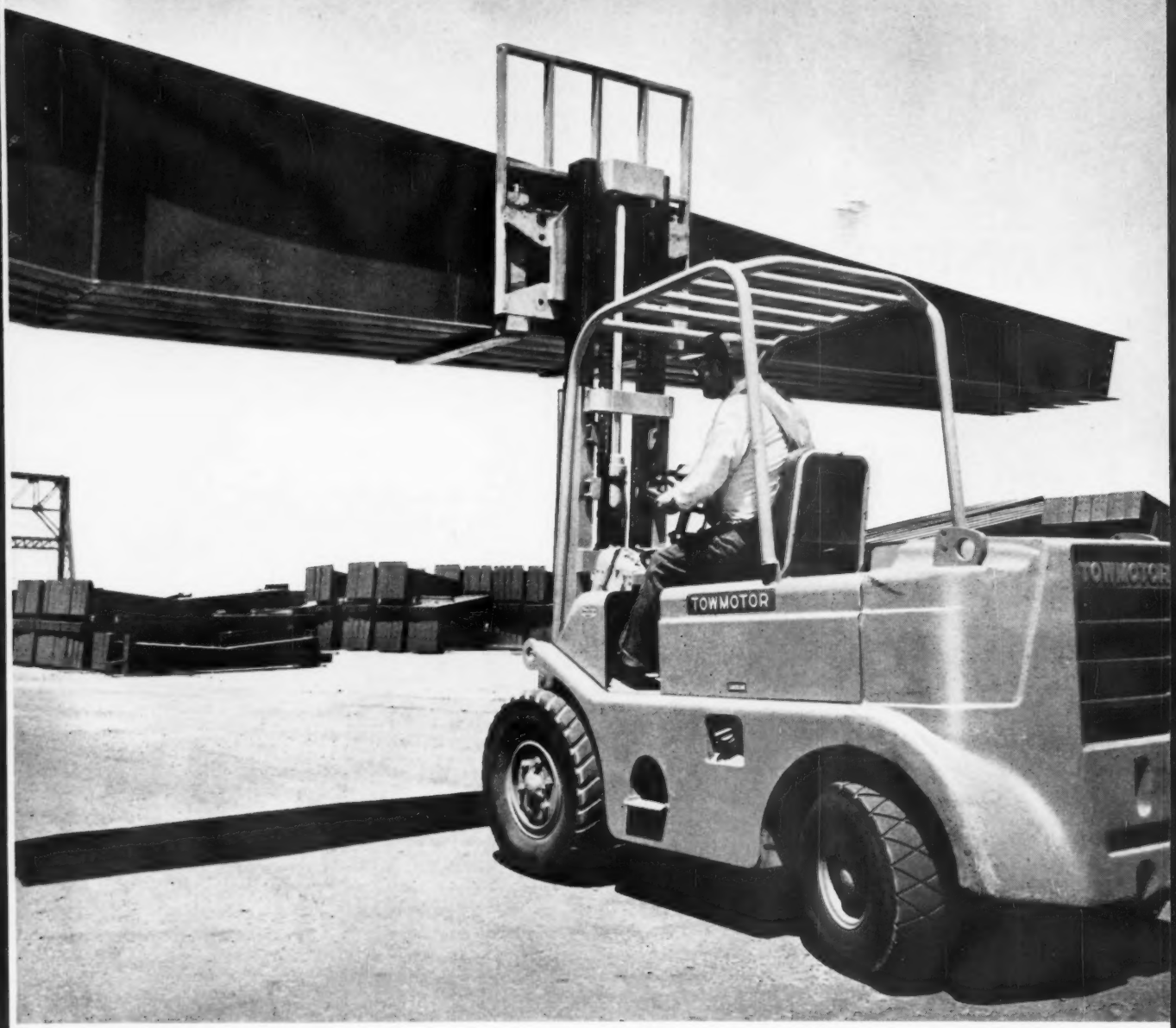
KENNAMETAL
...Partners in Progress

PLANNED MASS-HANDLING

your immediate attack against rising costs



IT'S A FACT: One of the latest Towmotor developments is a fork lift truck that stacks heavy loads 90° right or left in narrow six-foot aisles. Ask about "Naro-Aisle-Stack" Series.

YOU START CUTTING COSTS IMMEDIATELY when you use Towmotor fork lift trucks equipped with job-planned accessories like the Towmotor Extension Back Rest pictured above. Through planned mass-handling they put the right products in the right place at the right time . . . and increase your profits by safely moving bigger loads faster. Write for case studies that show you how companies similar to yours are reducing costs through more effective handling operations. TOWMOTOR CORPORATION, CLEVELAND 10, OHIO.

FORK LIFT TRUCKS, CARRIERS AND TRACTORS SINCE 1919

TOWMOTOR ® THE ONE-MAN-GANG — GERLINGER

Gerlinger Carrier Co. is a subsidiary of Towmotor Corporation

Furniture Manufacturers Call it

"BRIDGEPORT FREE-ER MACHINING BRASS ROD"

Manufacturers of a wide variety of products find Bridgeport Free Machining Brass Rod eminently suited to their items—from both a production and beauty point of view. Furniture manufacturers are but one successful example.

The production steps involved in manufacturing such furniture are frequently numerous and complex. For example, a solid brass tea cart such as shown here may represent some ten or more separate production steps. These include cutting, bending, drilling, tapping, twisting, polishing and lacquering, most of which are done on high-speed automatic equipment. The objective here, as with any screw machine operation, is high *uninterrupted* speeds. An increasing number of manufacturers are achieving these uninterrupted speeds with Bridgeport rod and tubing of various shapes and sizes. They find, on a comparative basis, that the high quality of Bridgeport Free Machining Brass is *constant* and can be depended on from end to end.

Bridgeport Free Machining Brass is but one of the many "easy-does-it" metals that are standard stock and immediately available from nearby Bridgeport Warehouses. An inquiry to your local Bridgeport Sales Office may lead to improving your product, increasing your production rate and raising your profits. Call today!

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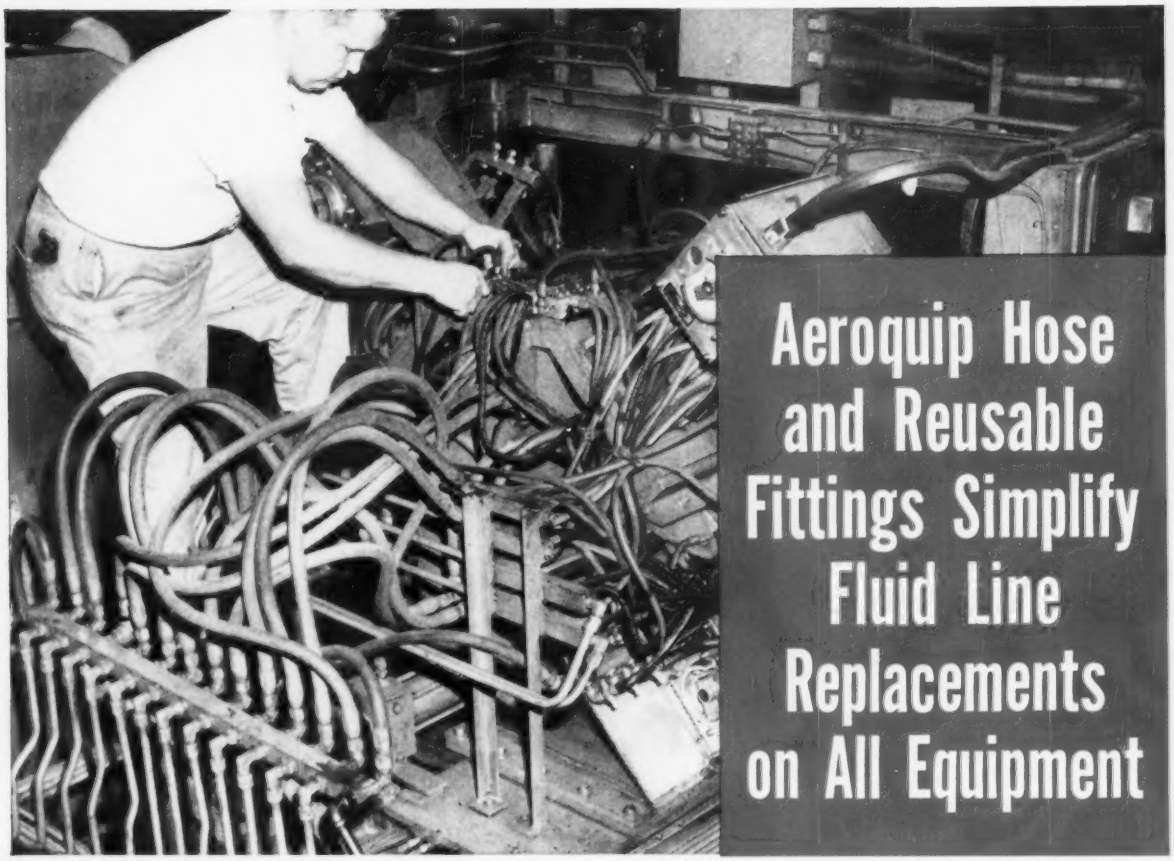
Specialists in Metals from Aluminum to Zirconium



Aeroquip Hose and Reusable Fittings Simplify Fluid Line Replacements on All Equipment

Aeroquip Hose Lines can be made to any required length. They assure quick, easy installation and routing of hydraulic lines.

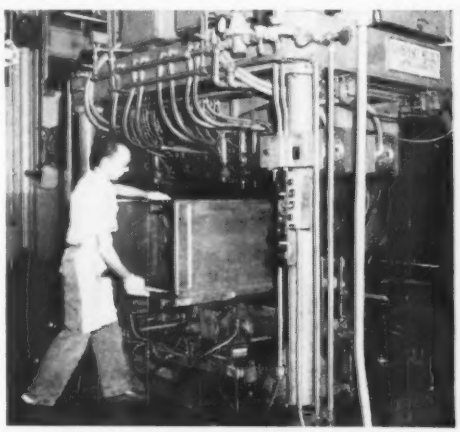
Aeroquip Hose and Reusable Fittings are ideally suited for fluid line replacements on all types of plant equipment.

They meet all installation requirements—With a small inventory of Aeroquip Bulk Hose and Reusable Fittings, flexible hose lines of any length can be made up and installed quickly, easily.

They assure dependable operation—Because Aeroquip Flexible Hose Lines are rugged and durable, they help reduce machine downtime, maintain production schedules.

Quick, low-cost maintenance—Aeroquip Reusable Fittings are designed to be used over and over again to make up replacement hose lines as needed, greatly reducing hose line maintenance costs.

For valuable help by a hose line specialist, call your Aeroquip Distributor. He's listed under "Hose" in your Yellow Pages.



On this high production welding machine, designed and manufactured by the Resistance Welder Corporation, Bay City, Michigan, Aeroquip Hose Lines are used in hydraulic positioning of range bodies for welding.

Aeroquip

AEROQUIP CORPORATION, JACKSON, MICHIGAN

INDUSTRIAL DIVISION, VAN WERT, OHIO • WESTERN DIVISION, BURBANK, CALIFORNIA
AEROQUIP (CANADA) LTD., TORONTO 19, ONTARIO

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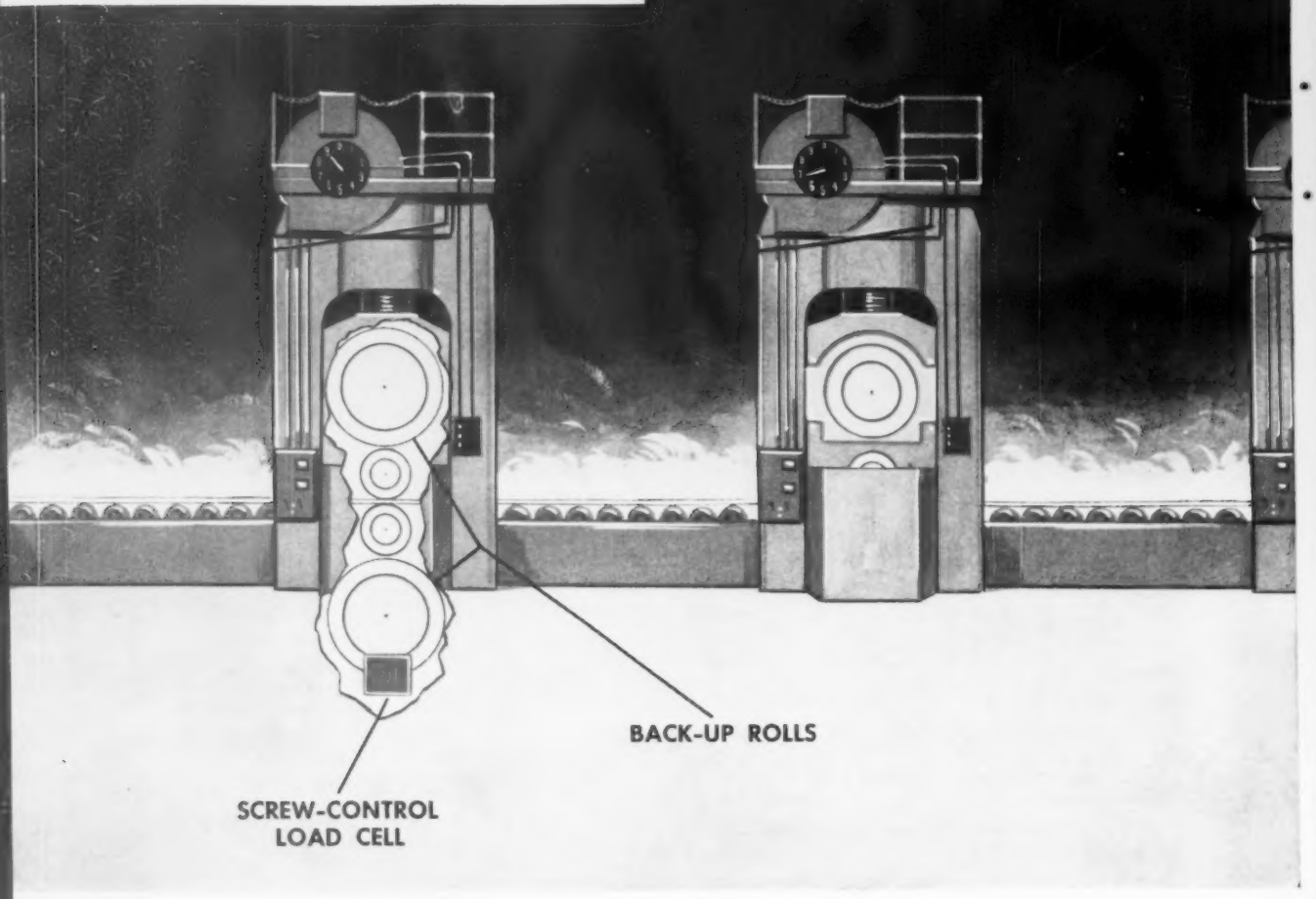
METAL ROLLING
AUTOMATED BY GENERAL ELECTRIC



AT USS GENEVA WORKS

G-E automatic gage control maintains

A new, vastly improved method of automatically controlling gage on hot-strip mills is available now. Greater strip uniformity and increased yield per ton of steel will result from use of this thickness control system, developed jointly with U. S. Steel Corporation engineers, and now installed at USS's Columbia-Geneva Steel Division, Geneva Works, Provo, Utah.

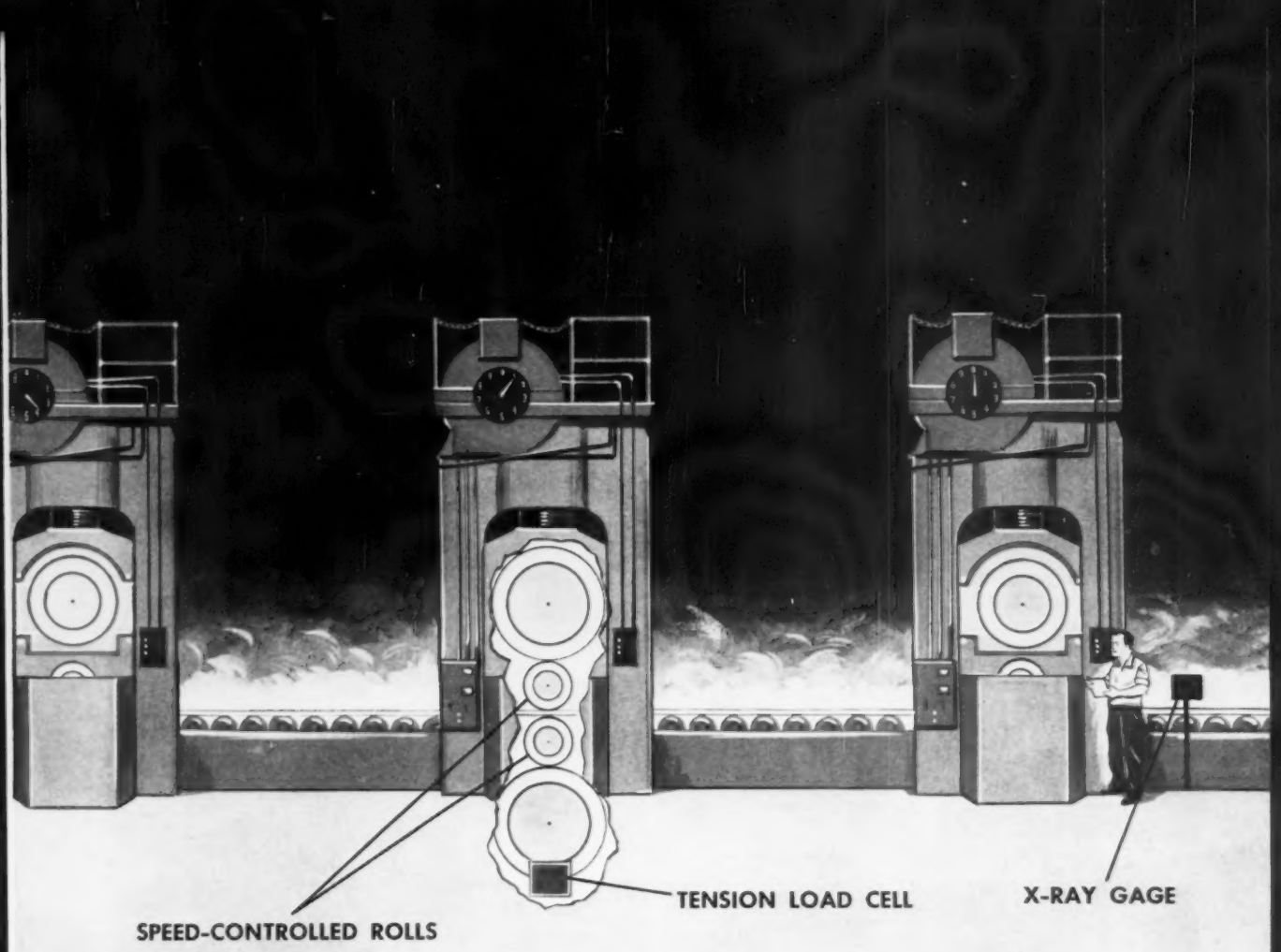
HOW UNIFORMITY AND YIELD ARE CONTROLLED

The system operates on the basis of off-gage steel automatically correcting itself by "triggering" the control to change the roll settings and inter-stand tension. As the temperature or gage of the strip being fed to the mill varies, the pressure against the rolls varies. At the second stand, this change in pressure is detected by the load cell where it is converted into power to move the screwdown motors. This entire operation is completely automatic and is initiated in a fraction of a second.

At the fifth stand, the same detection system is used to recheck the gage of the strip. However, at this point, the correction is made by adjusting the speed of the rolls, rather than their position. This controls the tension of the strip on either side of stand five, depending upon the correction required.

Automatic correction for hot and cold spots—As hot and cold spots pass through the mill, the control "feels" the difference in the hardness of the strip and automatically adjusts inter-stand tension to maintain a constant gage.

Strip "tail" is rolled to gage—The "tail" of the strip is often off-gage as a result of loss of tension as the end of the strip passes through the mill. The gage control



strip uniformity—increases yield

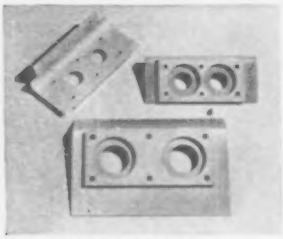
system adjusts the rolls or inter-stand tension to compensate for this loss of tension and rolls the "tail" to closer tolerance thickness, resulting in less scrap and greater yield.

Automatic correction for long-time drift—An x-ray thickness gage is normally used in conjunction with the control. The x-ray continuously measures the gage of the strip, and automatically makes corrections to compensate for thermal effects and mill drift.

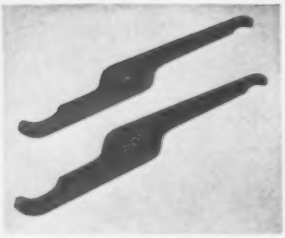
For complete details on this new gage control method, contact your G-E Apparatus Sales Engineer today, or write to Section 785-8, General Electric Company, Schenectady, N. Y., for bulletin GEA-6947. Industry Control Department, Salem, Virginia.

Progress Is Our Most Important Product

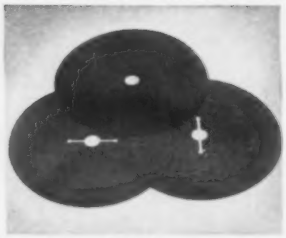
GENERAL ELECTRIC



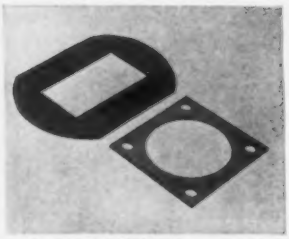
BAFFLE PLATES



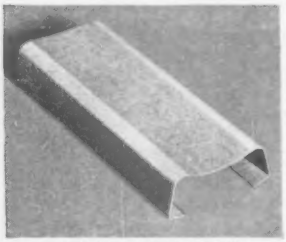
FUSE-PULLER PARTS



DISCS

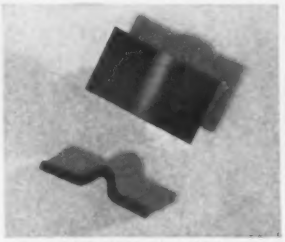


GASKETS



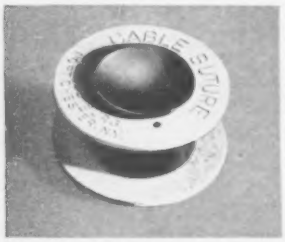
FORMED INSULATOR

SCREW

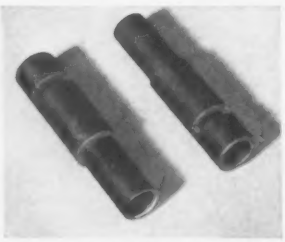


FORMED CLAMPS

INSULATING BUSHING



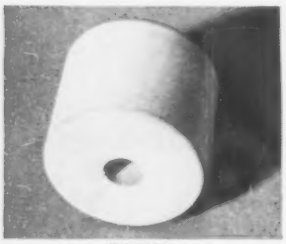
SPOOL



CABLE GRIP

BUSHING

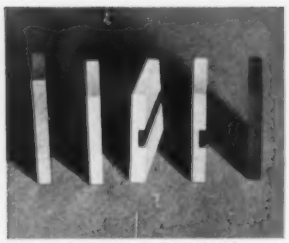
FORMED INSULATORS



ROLLER

NUMBER TAG

BINDER BUSHINGS



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FIBRE–the low-cost insulation of 1001 uses

Look what Diamond Vulcanized Fibre can do for you! And look what *you* or CDF can do with *it!*

If you can keep high-quality fibre clear of its worst enemy—moisture—you have the best economical insulating material you'd ever want for high arc-resistance, non-tracking, and long-time dielectric strength.

UNIQUE PROPERTIES • The high tensile, flexural, and impact strengths, the easy workability (ideal for screw machines), the Rockwell hardness (to R80), the light weight (half that of aluminum), the low cost, and the excellent electrical characteristics (arc-resistance up to 150 sec.) of CDF Fibre make it a highly attractive basic insulation for cost-conscious designers and purchasing men. Put these properties to work in your product.

FABRICATION FACILITIES • CDF has excellent and extensive facilities and know-how for turning out finished Diamond Vulcanized Fibre parts—better and more economically than you can do it yourself. We meet *your* specifications and *your* production schedules, and save you time and money in the bargain.

Send us your print or your problem, and we'll return technical literature. For the phone number of the CDF sales engineer nearest you, see Sweet's, Electronics Buyers' Guide, and other directories.

CDF makes Di-Clad® printed-circuit laminates, Diamond® Vulcanized Fibre, CDF products of Teflon®, flexible insulating tapes, Dilecto® laminated plastics, Celoron® molded products, Micabond® mica products, Spiral Tubing, Vulcoid®.

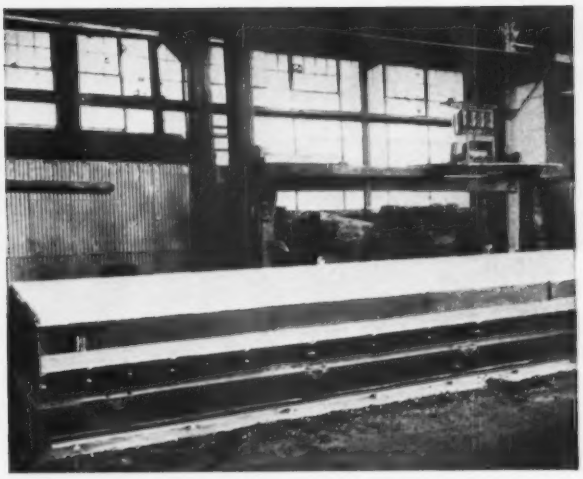
**du Pont trademark for its TFE-fluorocarbon resin.*

CONTINENTAL-DIAMOND FIBRE

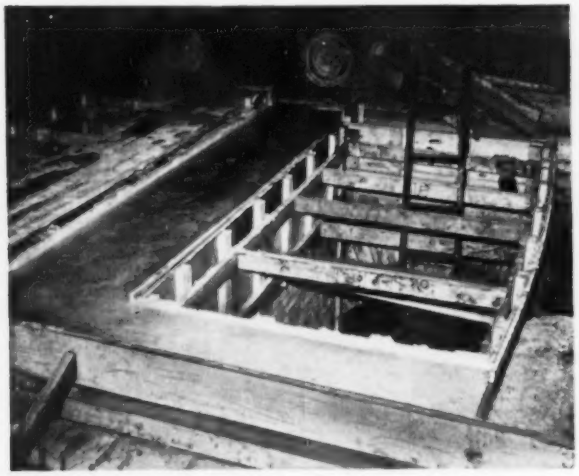
A SUBSIDIARY OF THE Budd COMPANY • NEWARK 85, DEL.

In Canada: Continental-Diamond Fibre of Canada, Ltd., 45 Hollinger Rd., Toronto 16, Ont.

In this stress-relieving furnace, B&W Kaocrete-D is used on the floor ledges, car top, in the door jamb and at the end of the flat roof where it withstands the abrasion of the door. This material is specially designed to withstand severe abrasive conditions and mechanical abuse.



Heavy duty car top service requires a high strength castable. B&W Kaocrete-D is excellently suited for this service at temperatures to 2500 F. B&W Kaocrete-32 is recommended for service above this range.



B&W Kaocrete-32 has been cast to form the curb walls of a soaking pit. When mechanical abuse from ingots damages the curb, Kaocrete-32 has the necessary properties to localize the damage, thus maintaining the serviceability of the rest of the curb.

The castable lining of this aluminum reverberatory furnace must have unusually high strength to withstand the considerable physical abuse of charging, operating and cleaning, while resisting the penetration of the molten metal. Kaocrete-D is widely used in this application.

How B&W refractory castables solve abrasion problems

Refractory castable linings used in metal-working furnaces are often subjected to severe mechanical abuse. Scraping by hand tools, loading and unloading, and the action of the molten metal and particle-laden gases all affect the life of refractories. Among B&W's line of refractory castables are two that are particularly suited to withstand unusual abrasive conditions. They are B&W Kaocrete-D and B&W Kaocrete-32, both of which have been used successfully in many demanding applications.

B&W Bulletin R-35A gives additional information on versatile B&W refractory castables. Write for copy to The Babcock & Wilcox Company, 161 East 42nd Street, New York 17, N.Y.

R606R

B&W

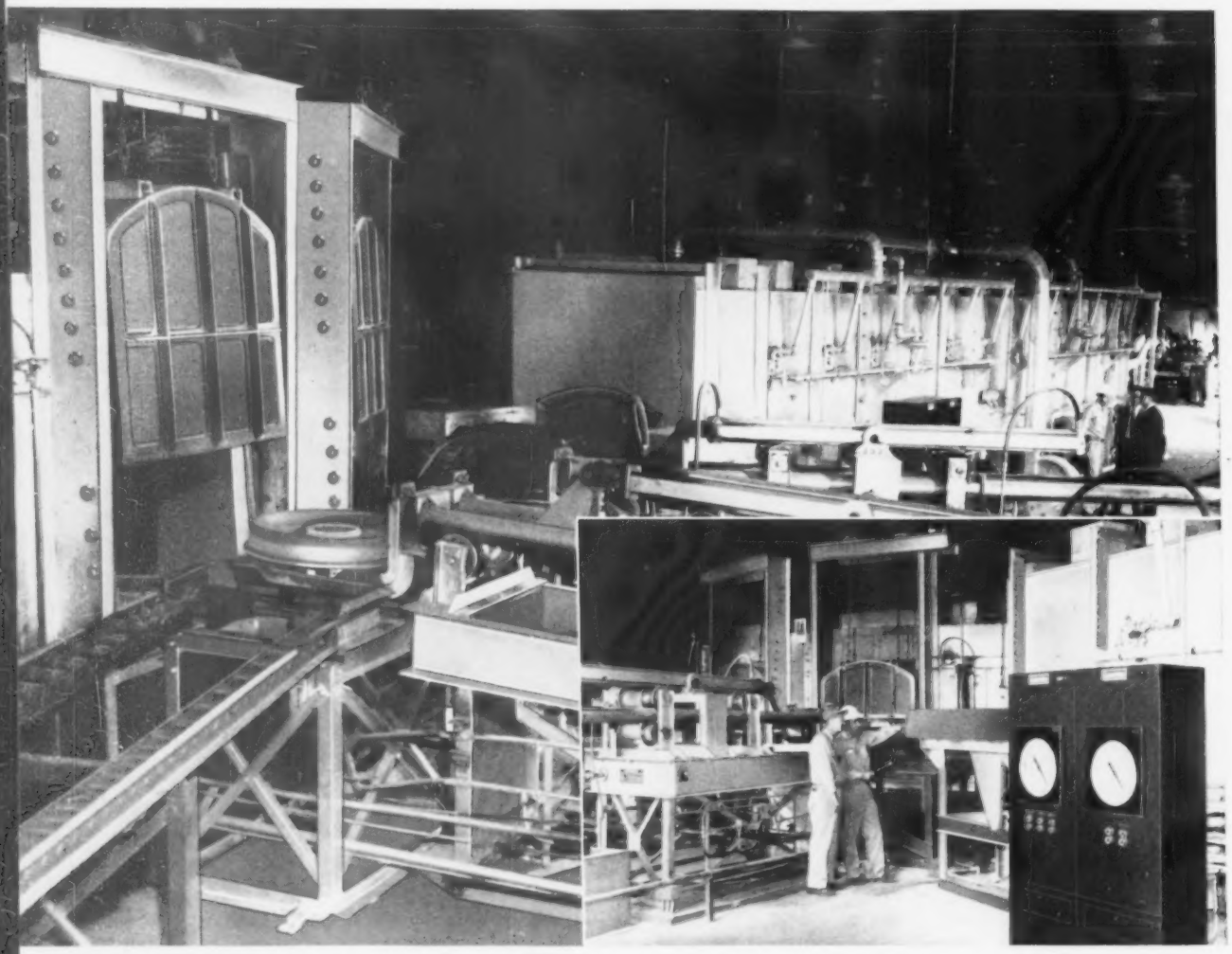
THE BABCOCK & WILCOX COMPANY

REFRACTORIES DIVISION

B&W Firebrick, Insulating Firebrick, and Refractory Castables, Plastics, Ramming Mixes, Mortars, and Ceramic Fiber.

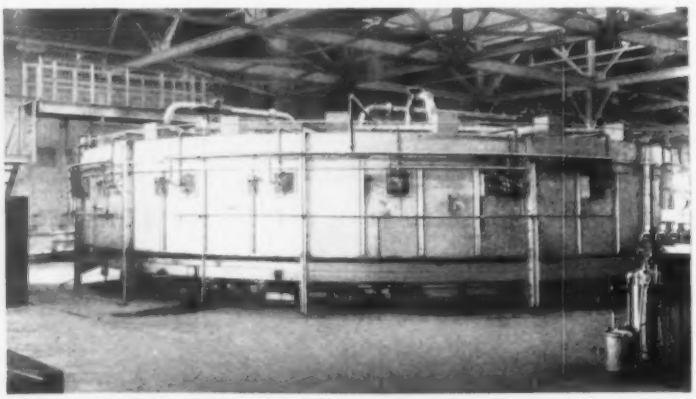
BIG JOBS ARE PART OF LINDBERG'S

Complete, automated heat treating installation at Griffin Wheel designed and installed



Several years ago, Griffin Wheel Company's plant at Colton, California began heat treating car wheels in a Rotary Hearth Furnace designed and installed by Lindberg Industrial Division. It was one of four similar installations at other Griffin plants in United States and Canada. Recently, when production at the Colton plant needed to be doubled, Griffin again called on Lindberg Industrial engineers to develop the necessary methods and equipment. The desired result was accompanied by a specially designed Preheat Furnace shown at the right above, engineered and installed by Lindberg Industrial and automated to work efficiently with the original Rotary Hearth Furnace. Inset shows the Lindberg control panels conveniently installed for operation of both furnaces.

The operation of both furnaces was completely automated. The above photo shows the charging of the Preheat Furnace and the automatic conveyor which moves the wheels through the Preheat Furnace and delivers them to the Rotary Hearth Furnace.



The original Rotary Hearth Furnace at Griffin has an outside diameter of 44'. Initial capacity of 13,000 lbs. per hour was doubled with the installation of the new Preheat Furnace.

FULL SERVICE

by Lindberg Industrial Division

A PLUS DIMENSION IN SERVICE TO USERS OF HEAT FOR INDUSTRY

Most everyone knows Lindberg as a builder of fine equipment for any industrial heating need. But there is a plus dimension to Lindberg's service that is available to any industry whose product requires heat in its making.

For such people we offer the complete designing, engineering, building and installation of the necessary equipment and facilities to process any product requiring heat—in the quality and quantity desired by its maker. This service covers broad requirements—plant layout and construction, when desired, complete, automated production lines or just specially engineered industrial heating equipment efficiently integrated into your production processes.

You obtain many advantages when you offer your industrial heating problems to Lindberg. You get the combined skills of what we believe to be the country's finest group of engineers and technicians in the industrial heating field, with many years experience in the solution of all types of "heat for industry" problems. You need give us only your end product specifications and you will get the installation, from one responsible source, guaranteed to achieve the results you need and ready to go to work at the turn of a switch.

Our experience covers the whole range of industrial heating methods so you can rely on us to recommend the processes most suited for your specific need.

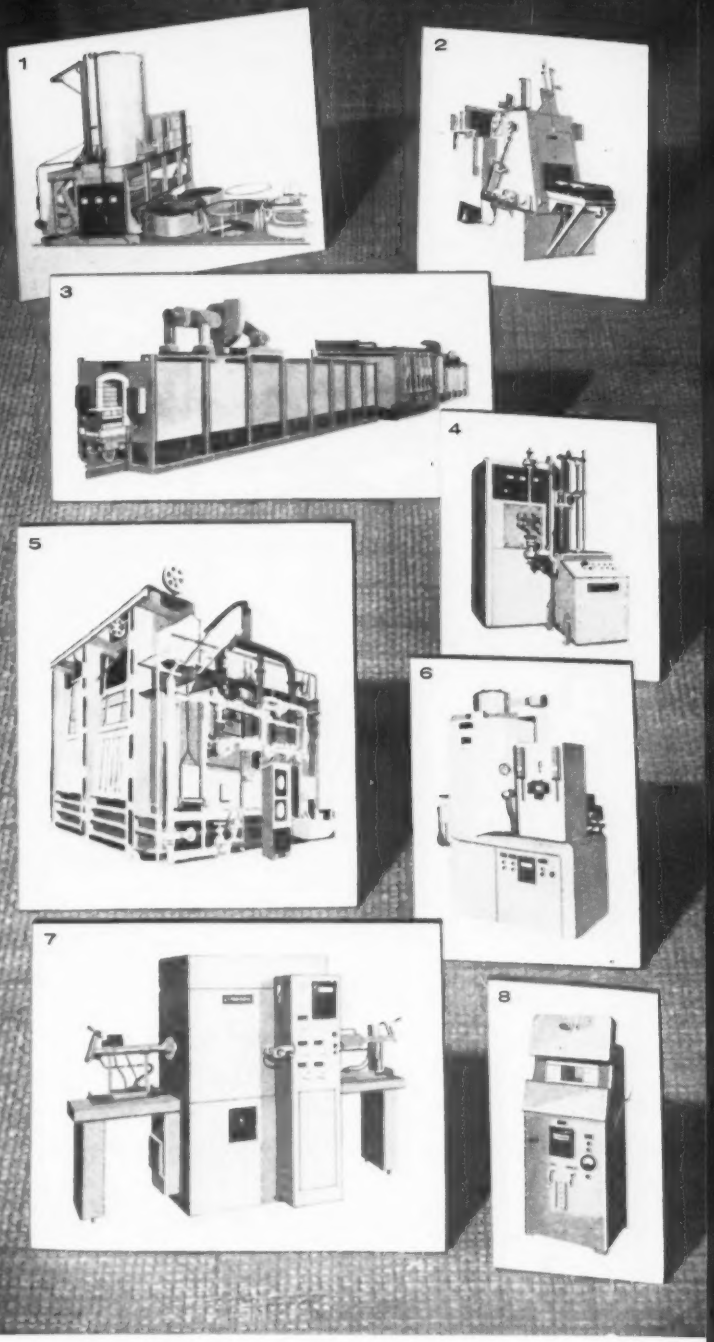
Whatever size your installation need be, no matter how rigid your quality specifications are, turn the complete job over to Lindberg. You'll be happy with the results.

Lindberg Field Engineers are available in 23 major industrial centers in this United States and Canada (see classified telephone directory) or write direct to: Lindberg Industrial Division, Lindberg Engineering Company, 2321 West Hubbard Street, Chicago 12, Illinois. Los Angeles Plant: 11937 South Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg, Ltd., Toronto.

LINDBERG

heat for industry

THERE'S LINDBERG EQUIPMENT FOR EVERY INDUSTRIAL HEATING NEED



1 Gantry Type Furnaces: Lindberg Industrial Division has installed a number of Gantry Type Furnaces with auxiliary equipment for heat treatment of missile and rocket components.

2 Heat Treating Furnaces: For every requirement, large or small, electric or fuel fired, factory built or field-installed. Shown: Automated Integral Quench Type Carbonitriding Furnace.

3 Ceramic Kilns: All types of kilns: automatic, atmosphere controlled, high temperature, tunnel and periodic. Shown: Tunnel Kiln with two automatic control zones for temperatures up to 3200° F.

4 High Frequency Units: Complete range of induction heating units and fixtures. Shown: New Floating Zone Scanner for production of hyperpure materials for semi-conductors.

5 Melting and Holding Furnaces: Equipment for any non-ferrous metal requirement including: electric resistance and two chamber induction types, reverberatories, dry hearths and crucibles. Shown: Field-installed Reverberatory Furnace, 80,000 lb. capacity.

6 Atmosphere Generators: Generators for all required furnace atmospheres. Shown: Hyen Generator for endothermic atmospheres.

7 Pilot Plant Equipment: Complete group of intermediate sized furnaces for pilot plant and small production application. Shown: New Graphite Tube Furnace, temperature range 2500° F. to 5000° F.

8 Laboratory Furnaces: Complete line of laboratory furnaces from simple hot plates to specialized research units. Shown: Versatile, wide temperature range Laboratory Box Furance.

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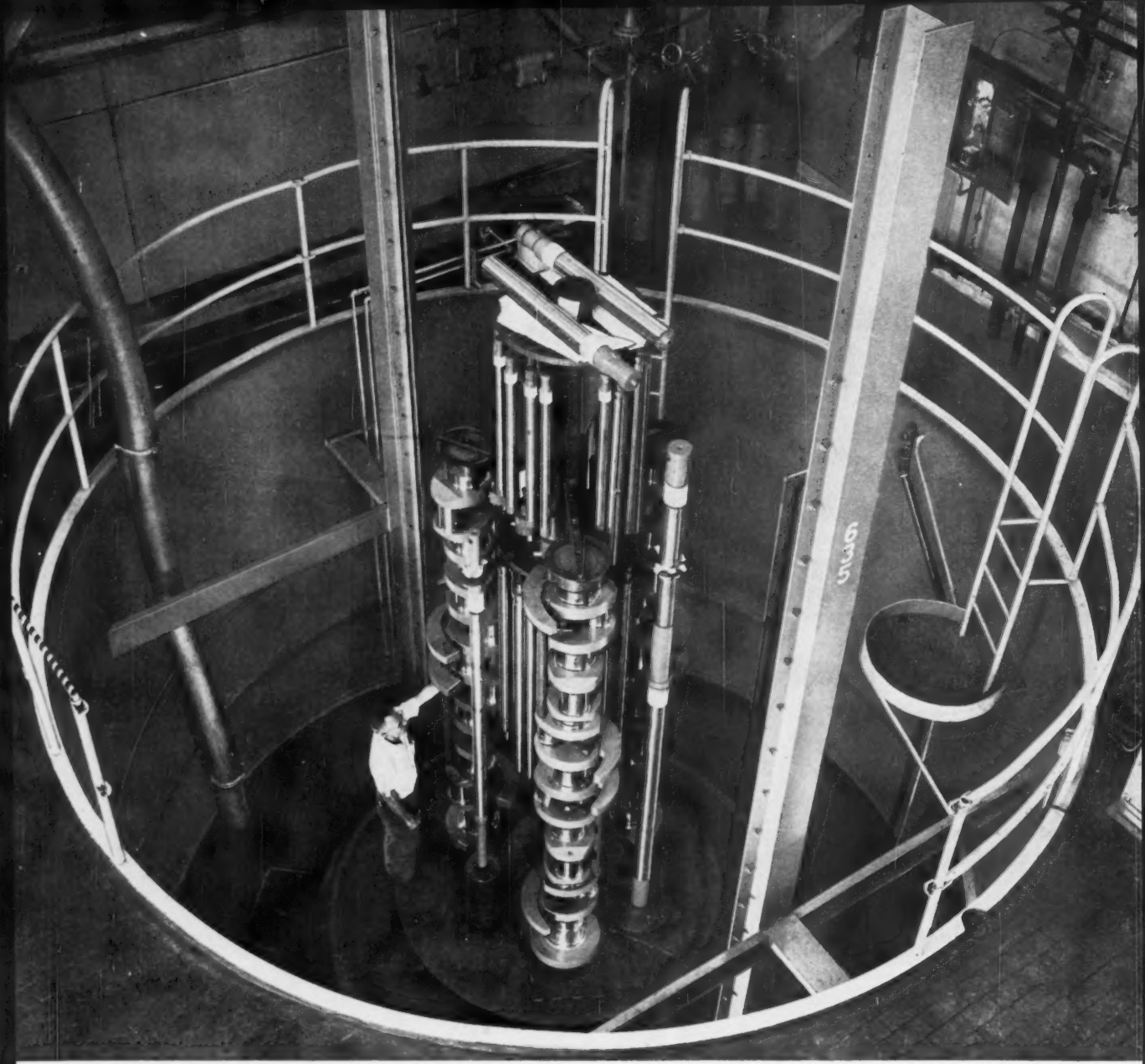

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and nitride-hardens them, too?

National Forge does it—with a nitriding installation that is one of the largest and most modern in existence. Now diesel crankshafts, pump eccentrics, compressor pistons and rods, gears, marine couplings, and many other machinery parts are not only *forged* at National, but *nitride-hardened* to add strength and reduce wear. Vertical nitriding furnaces like the one illustrated will accommodate forgings up to 16 feet in length.

National Forge also has its own basic electric melting facilities and produces all the usual types of nitriding steels, including the recently developed 5% nickel, 2% aluminum grade. For further information, write for bulletin NH-1058.

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NATIONAL FORGE COMPANY

IRVINE, WARREN COUNTY, PENNSYLVANIA

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For more information on "the tough ones," and the machinery that makes them "best"—write for bulletin NFO

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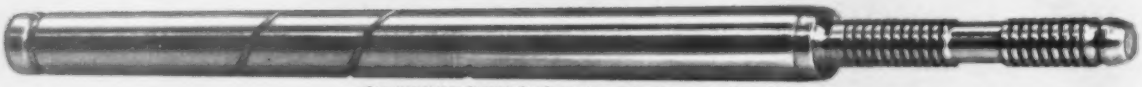
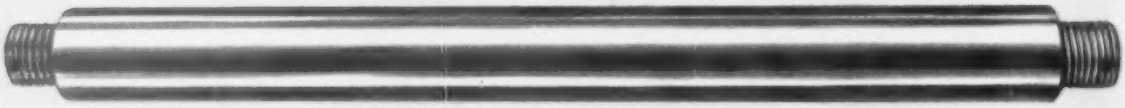
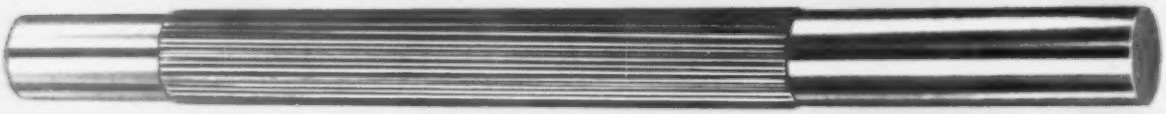


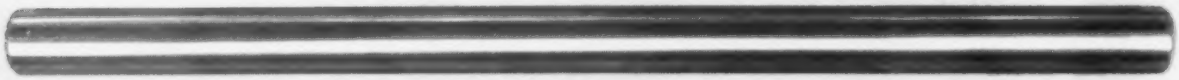
CENTURY SERIES C-1144 Distributor Shaft



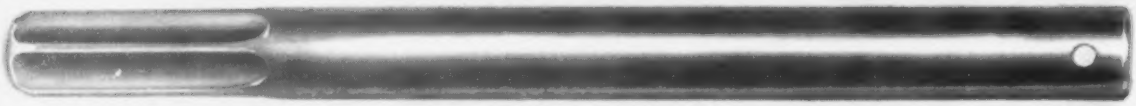
CENTURY SERIES C-1141 Hoist Support Shaft



CENTURY SERIES C-1151 Electric Motor Shaft



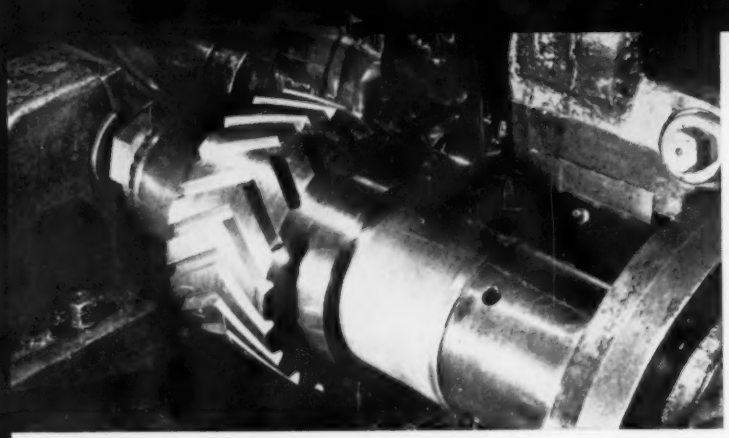
CENTURY SERIES C-1050 Axle



CENTURY SERIES C-1045 Shaft

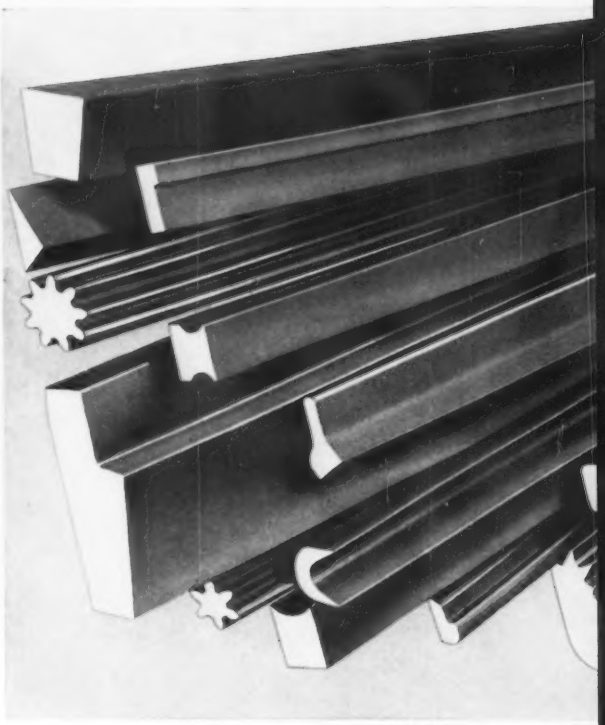
GRADE	ANALYSIS EXTRA	BEST COMBINATION OF STRENGTH & TOUGHNESS	MACHINABILITY
C-1144	$1.35		
C-1141	1.10		
C-1151	.70		
C-1050	.15		
C-1045	.15		

TO SAVE TIME AND MONEY in steel parts production, select from Republic's CENTURY SERIES of high strength, stress-relieved, cold finished steel bars. With varying degrees of machinability (as seen in the chart), each of the five grades provides a minimum yield strength of 100,000 psi. Better strength/toughness ratios are frequently obtained by selecting one of the less expensive, lower sulphur steels.



FOR ADDED MACHINABILITY, consider Republic Cold Drawn Leaded Alloy Steels. Leading producers of gears use Republic Leaded Alloy Steel in the production of heavy-duty herringbone gears. The addition of lead increases machinability as much as 25%. Heat treating assures adequate hardness and toughness. These cost-reducing alloys are available in almost every standard analysis and many specials. Mail the coupon for information.

TO REPLACE COSTLY ASSEMBLIES WITH ONE PIECE SHAPES, select Republic Cold Drawn Special Sections formed to the predominating cross section of the part. Eliminating or greatly reducing machining, Republic Special Sections permit faster output at lower unit cost. Completed parts are stronger and longer wearing because cold drawing improves the mechanical properties of any given analysis. Available in carbon, alloy, and stainless steels. Mail coupon for data.



CENTURY SERIES BOOKLET

Want more facts? This free booklet provides the basic facts you need to determine where Republic's CENTURY SERIES may help you save time and money. Simply return the coupon.

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City_____ Zone____ State_____

Another example of National Roll quality control

Elmer Grinder, left, of National's steel foundry discusses chill location with Bill Williamson of the Sales Department.

Roll molds determine life, not just dimensions

Molding techniques for steel rolls are, of course, directed at obtaining a casting with accurate dimensions for economical machining into precise shaped or plain rolls.

But just as important as dimensions—determined by the "sweep" pattern shown above—is the metallurgical function built into every roll mold. Metal "chills" are carefully located to control cooling of the steel in a manner that will produce a roll both metallurgically and physically sound.

Started on paper, the chill layout is translated into a mold of metal and sand under the watchful attention of National's experienced steel foundry personnel. These men know foundry practice. But perhaps more importantly, they know the demands that are made on roll soundness in the customer's mill.

This is a part of National's service which means better rolls for you. It's one of the many reasons why . . .

National's the growing name in rolls

NATIONAL ROLL & FOUNDRY DIVISION

GENERAL STEEL CASTINGS CORPORATION, Avonmore (Westmoreland County), Pa.

General Steel Castings Corporation, General Offices: Granite City, Illinois • Plants: Granite City, Ill., Eddystone, Pa., Avonmore, Pa.

Soft Rubber Boots Prevent Injury to men or machines. A-B pendant stations are available with from 2 to 16 units, plus emergency stop unit in bottom of enclosure.

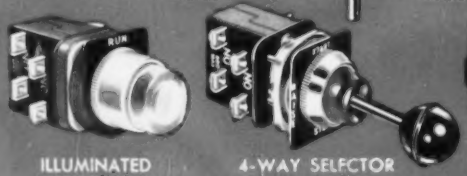
Allen-Bradley offers the

MOST COMPLETE LINE

of oiltight heavy-duty

CONTROL UNITS

The wide selection of Allen-Bradley Bulletin 800T push buttons and control units will enable you to satisfy each and every control station requirement. A-B control units and stations have seals to exclude oils and cutting fluids—contacts cannot become fouled. And *all* control units have the popular A-B double break, silver contacts that assure reliable operation—without maintenance. The rugged construction, flexibility, and generous wiring room of Allen-Bradley's Bulletin 800T line are "bonus" features. To get the best in every way—insist on Allen-Bradley. Send for Publication 6090, today.

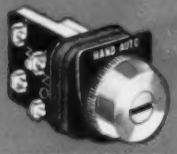


ILLUMINATED PUSH BUTTON
Space-saving two-in-one control unit.

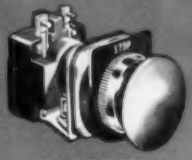
4-WAY SELECTOR SWITCH
Can also be furnished for 2-way operation.

ENCAPSULATED PILOT LIGHT
Transformer type for rugged 6-volt bulb.

PUSH-TO-TEST
Six different color lenses available.

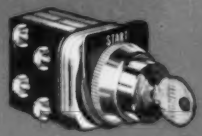


SELECTOR SWITCH
With coin slot operator. Other operators available.



TIME DELAY
Delay adjustable from 0.5 to 5 seconds.

POTENTIOMETER UNIT
Furnished in 2- or 5-watt capacity ratings.



LOCK TYPE
For selector switch or push button operation.

DOUBLE CIRCUIT
Has 2 N.O. or 2 N.C. sets of contacts.

16 UNIT STATION
in die-cast aluminum enclosure. Sheet metal cabinets also available for up to 25 control units.

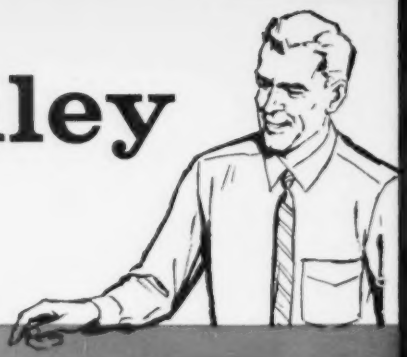
ALLEN-BRADLEY

Member of NEMA

QUALITY MOTOR CONTROL

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. • In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

Yes, Allen-Bradley also makes...



DC Contactors

Here's the only line of DC contactors using the simple solenoid design—with ONE moving part—in all ratings through Size 4. And their double break, silver alloy contacts never need servicing.

BULLETIN 202

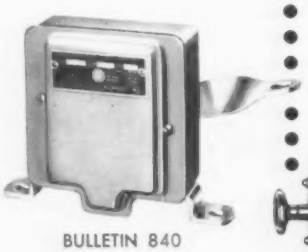
DC Control Relays

These relays are the counterpart of the Bulletin 700 line of AC relays—of which millions are in service. With only ONE moving part—these relays provide the ultimate in long life and reliability. Like the AC line, they have double break, silver contacts that never need maintenance. Made in a variety of types and with up to 8 switching poles.

BULLETIN 200

Float Switches

This versatile line of float switches is available in a wide range of types and enclosures to handle practically every industrial pumping job. They all feature a snap-action switch mechanism for positive operation no matter how slowly the liquid level changes.

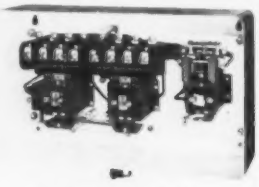


BULLETIN 840

BULLETIN 1209

Loom Switch

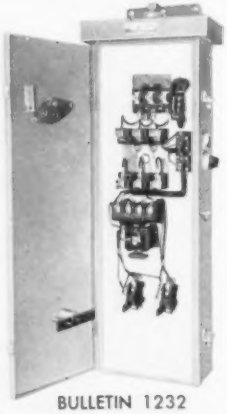
Manual starting switches designed for textile loom service. Design of operating lever makes accidental operation impossible. Lint-tight enclosure eliminates fire hazard.



BULLETIN 1270

Automatic Transfer Switches

For use where power must be maintained, these panels automatically transfer the load to an auxiliary supply when normal supply fails or falls too low. Transfers automatically when the normal power supply is resumed. Mechanically interlocked.



BULLETIN 1232

Pump Control Panels

Designed for irrigation and oil field pumping applications. Can also be used with outdoor lighting systems. Uses standard A-B Bulletin 709 solenoid starter with manual disconnect switch or circuit breaker in weatherproof enclosure. Available with many optional features.

BULLETIN 410

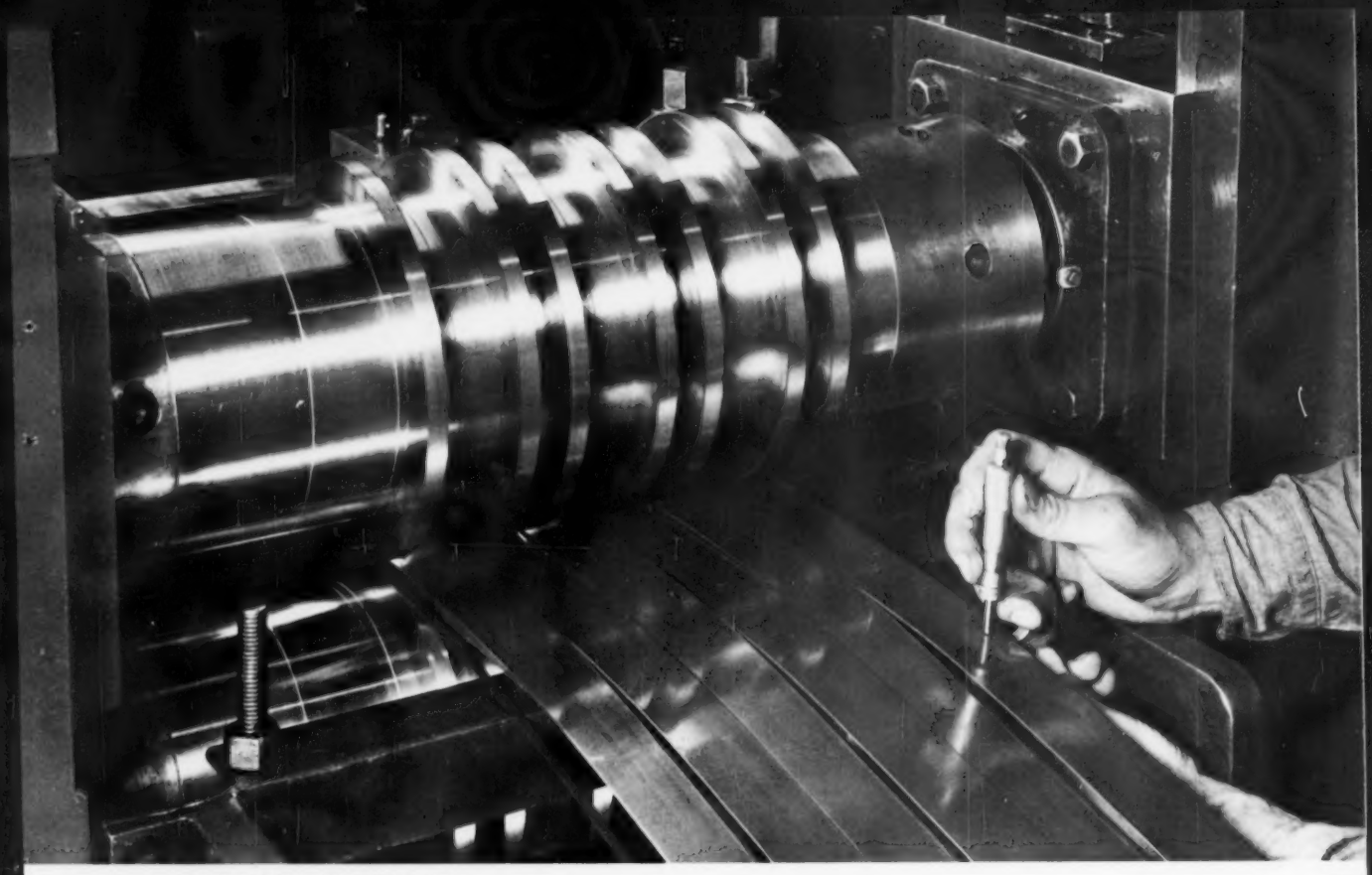
AC and DC Rheostats

Provide absolutely stepless control over a wide resistance range. Full wattage capacity available at all settings. Sizes to 5400 watts.

4-60-RM

ALLEN-BRADLEY Member of NEMA | *Quality* **Motor Control**

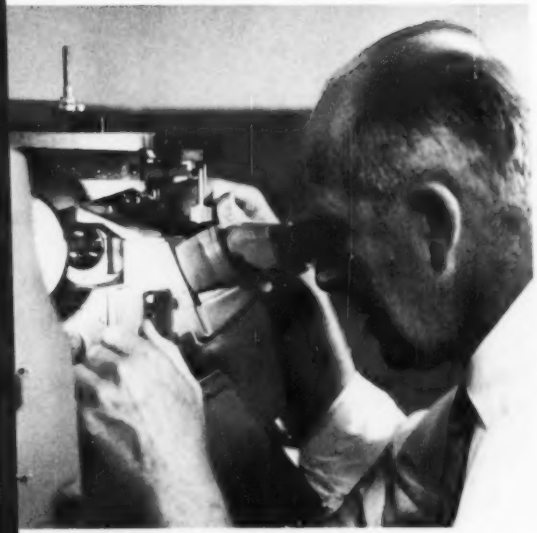
Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. • In Canada: Allen-Bradley Canada Ltd., Galt, Ont.



PRECISION SLITTING of cold-rolled spring steel is made possible because of careful quality control at every step.

From Athenia Steel . . .

High-quality, high-carbon spring steel



METALLOGRAPH for determining metallurgical properties of steel plays important role in Athenia's precise stock selection.

For over 50 years, the Athenia Steel Division of National-Standard has been producing cold-rolled spring steel, specialized and alloy steel, and cold-rolled flat wire for hundreds of industrial applications requiring high-quality specialty steels. This outstanding quality is due to proper raw material selection, precise laboratory control through final processing, modern equipment and technical knowledge.

SPRING STEELS, cold-rolled annealed, are produced in thicknesses of .001″ to .065″, in widths from .015″ to 16″. Range of tempered spring steel is .001″ to .065″ thick, .015″ to 6.5″ wide, with the following finishes: Black or Scaleless, Polished Bright, Polished and Blued or Strawed. Athenia also produces narrow flat stainless steel and cobalt-base NILCOR®.

TECHNICAL HELP from Athenia engineers is available to determine the specific flatness, straightness, uniformity, temper, edge, finish or special feature you need. For engineering assistance, write to Athenia Steel with details of your requirements, or ask for the new brochure describing Athenia products, service and manufacturing facilities.

NS NATIONAL-STANDARD COMPANY

Athenia Steel Division

NATIONAL-STANDARD COMPANY

Clifton, New Jersey

NS SPECIAL WIRE KEEPS SPRINGS ALIVE IN 1400° BATH

When a leading manufacturer of microwave assemblies and radar components was faced with a serious production bottleneck in a high-temperature dip-brazing operation, they came to National-Standard for help in solving the problem.

CRITICAL MICROWAVE ASSEMBLIES being brazed in a 1400° salt bath were held together by cumbersome weights and intricate fixtures that frequently caused distortion or slippage during the brazing operation. The solution—and a considerable time and money saver—was to clamp all the components with springs that would allow expansion of the various parts during brazing without distorting the assembly. However, conventional spring wire would not retain tension at 1400°. Once used, springs had to be discarded.

NATIONAL-STANDARD ENGINEERS, working with the manufacturer's engineers, tested a new superalloy spring wire, NS-25 (L605), that proved "as good as new" after several hundred brazing operations at 1400° F. The mechanical stability of NS-25 spring wire insures proper expansion of parts during heating and maintains just the right tension to give mating parts good contact and perfect bond. The result is manufacturing that is simplified, faster and more precise than was previously possible.

EXPERIENCED ENGINEERING HELP of this kind, for jobs requiring high-quality wire, to meet special or unique applications, is available to you from National-Standard. Write for additional information to National-Standard Company, Niles, Michigan.

MICROWAVE ASSEMBLIES are held together in 1400° brazing bath by springs made of NS-25 wire. This special alloy wire allows rapid, precise brazing never before possible.

NS NATIONAL-STANDARD COMPANY

Manufacturer of Specialty Wire and Metal Products

NATIONAL-STANDARD COMPANY

Niles, Michigan

NATIONAL-STANDARD PLANTS ARE SERVICE-LOCATED NEAR YOU...

National-Standard Company is a specialized manufacturer of high-quality wire, wire cloth, flat spring steel and perforated metal. With manufacturing and warehousing facilities around the world, National-Standard is ideally organized to serve your special wire or metal products requirements. For fast delivery or experienced engineering services, contact the National-Standard plant or warehouse nearest you.

NATIONAL-STANDARD DIVISION

Music spring wire, stainless steel wire, super-alloy wire, plated wire, tire bead wire, flat and tubular braid.

Niles, Michigan
Akron, Ohio
Los Angeles, California

ATHENIA STEEL DIVISION

Cold rolled high carbon flat spring steel, tempered or annealed; alloy steel, high-carbon and stainless steel, flat wire

Clifton, New Jersey

REYNOLDS DIVISION

Wire Cloth Plant

Full range of weaves, metals, and coatings; specialty weaves

Dixon, Illinois

Cross Perforated Metals

Commercial, ornamental and industrial perforated metals

Carbondale, Pennsylvania

WORCESTER WIRE DIVISION

Fine high and low carbon wire, music spring wire, stainless steel wire, plated wire, other specialty wires.

Worcester, Mass.

WAGNER LITHO MACHINERY DIVISION

Metal decorating equipment

Secaucus, New Jersey

NATIONAL-STANDARD *plants are also located in Guelph, Ontario; Kidderminster, England; Port Elizabeth, South Africa; and Cologne, West Germany.*

WAREHOUSES

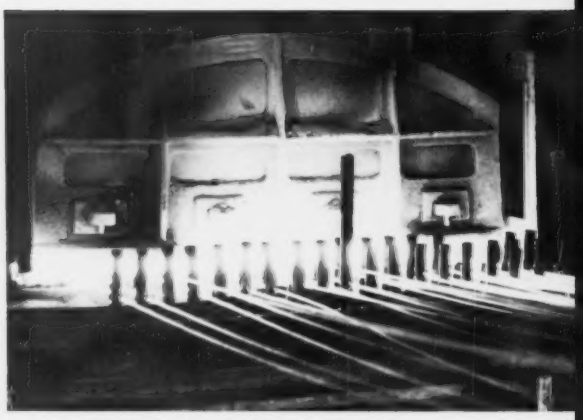
NATIONAL-STANDARD, ***Akron, Ohio***
Music Spring Wire, Stainless Steel Wire

NATIONAL-STANDARD, ***Plainville, Connecticut***
Music Spring Wire, Stainless Steel Wire

Other warehouse facilities are located in key industrial areas.

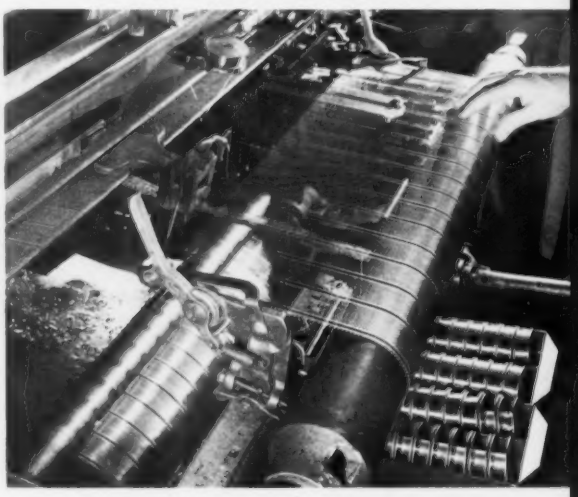
NS NATIONAL STANDARD COMPANY

NATIONAL-STANDARD COMPANY
Niles, Michigan

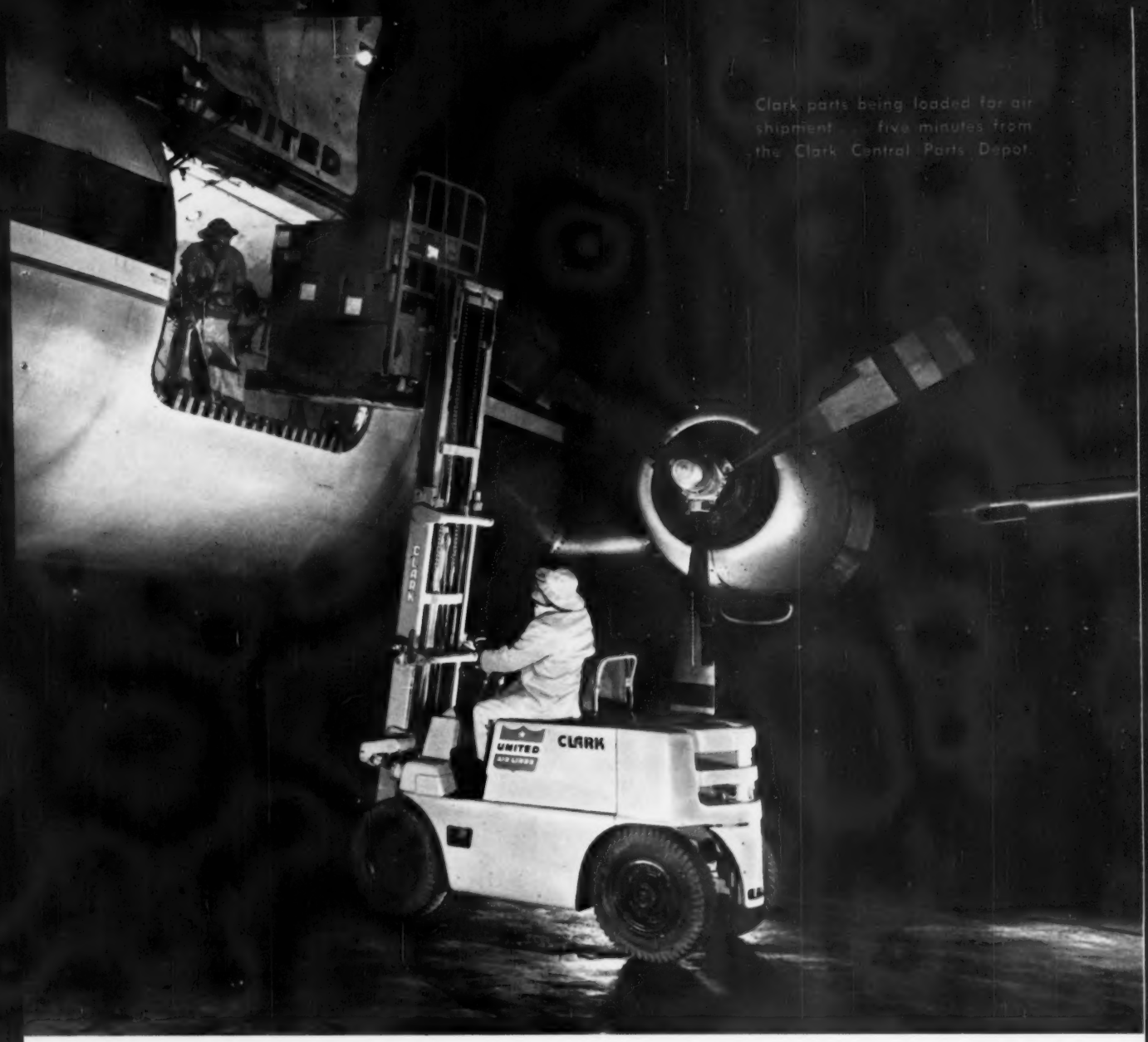


SPECIALTY WIRE of many types is produced by National-Standard and Worcester Wire plants, and stock is located near most major industrial areas.

INDUSTRIAL WIRE CLOTH woven from variety of metals in wide selection of weaves by the Reynolds Division is employed in hundreds of filtering, straining, and reinforcing applications.



FLAT SPRING STEEL manufactured by Athenia Steel Division meets rigid specifications for high-carbon steel utilized in many products where quality and precise manufacturing controls are important.



Clark parts being loaded for air shipment . . . five minutes from the Clark Central Parts Depot.

Make sure of the service . . . before you buy!

Costs start climbing the minute a fork truck goes out of service. The national average for truck downtime is conservatively estimated to be $16.48 per hour. An important reason why fast, qualified parts service is essential.

It's why Clark dealers offer you the largest inventory of parts in the industry. It's why Clark maintains a 16,000 mile private wire communication system. It's why Clark has built a multi-million dollar parts warehouse near Chicago's Midway Airport.

Everything in the Clark service system is geared to speed. Vital materials handling equipment must be back on the job *fast!* To assure you of fast service Clark provides you with over 117 service facilities throughout the nation . . . each carrying a complete parts inventory. To back this up, the Clark Central Parts Depot maintains an inventory of over 5 million parts . . . emergency parts that can be air-shipped to any part of the country in a matter of hours. *Only* Clark offers you this service.

Want to see how it's done? A colorful brochure and a film strip describing this service system are available through your local Clark dealer. You'll find him listed in the yellow pages under "Trucks, Industrial." Or, if you prefer, write direct to: Clark Parts Service, Clark Equipment Company, Battle Creek, Michigan.

CLARK® EQUIPMENT

Printed in U. S. A.

it's not the first cost
it's the upkeep

As any husband knows, the cost of the marriage license is only the beginning.

It's often the same in buying steel. It isn't the first cost, but *living* with it that gets expensive.

If you use up inventories rapidly, buying at the quantity price can be a real economy.

But if you keep steel inventories several months and if you have a lot of cash tied up in space and equipment, your *real* "cost of possession" may be a whole lot higher than you think it is—and than it needs to be!

Maybe paying a slightly higher initial cost for ready-to-use steel through a Steel Service Center can be an actual economy for the quantities required to meet your *current* needs.

FREE BOOKLET—For more information get the booklet, "*What's Your Real Cost of Possession for Steel?*". Simply write Steel Service Center Institute, Inc., 540-P Terminal Tower, Cleveland 13, Ohio.

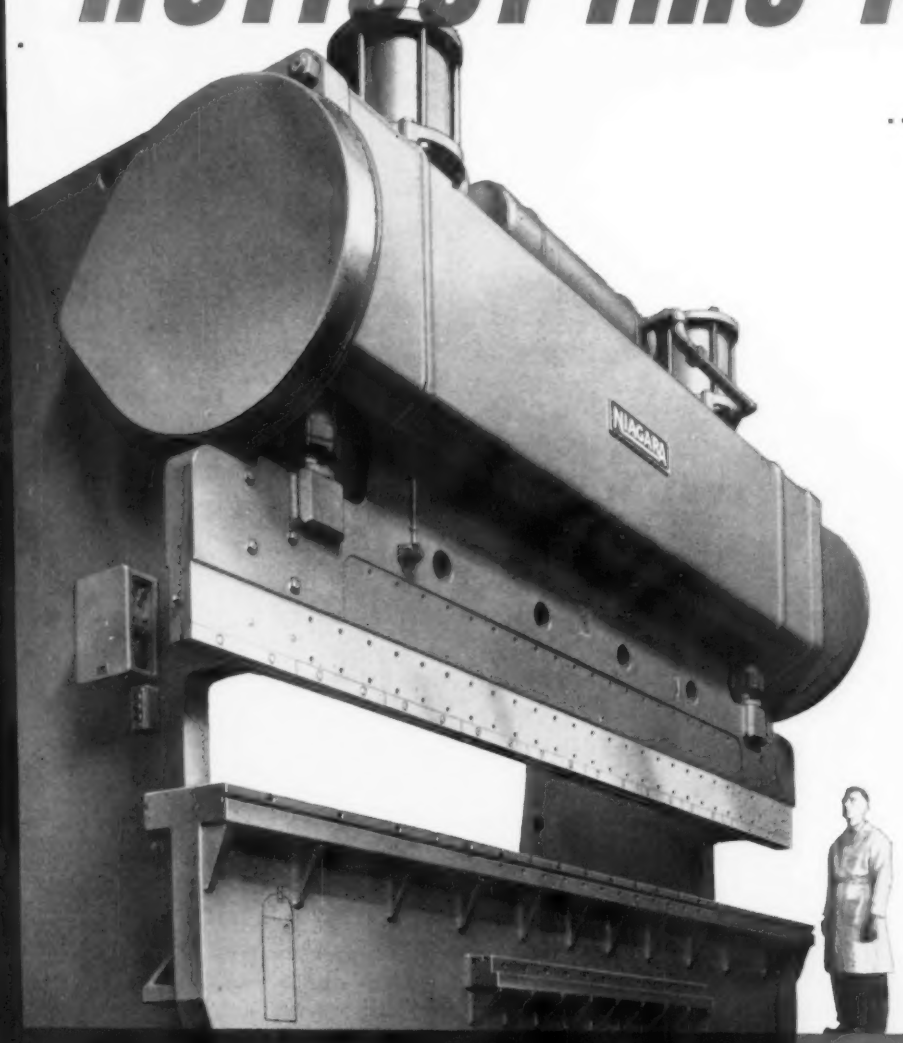
STEEL SERVICE CENTER INSTITUTE

. . . YOUR STEEL SERVICE CENTER

NIAGARA PRESS BRAKES

MMT=PE
MODERN MACHINE TOOLS = PRODUCTION EFFICIENCY

hottest line today



...way out front in production-boosting, cost-cutting features... highest dollar value of all

Hottest line in the industry, more Niagara Press Brakes are being bought today than ever before.

What's behind it? **Performance!** Downright, measurable, press brake performance! High hourly output with minimum operator effort is setting new work standards in plant after plant.

How about you? Want to sail through your schedules at record-breaking speed... cut your operating and maintenance costs to the bone... hold your capital investment to a **practical minimum... then Niagara is the press brake for you.**

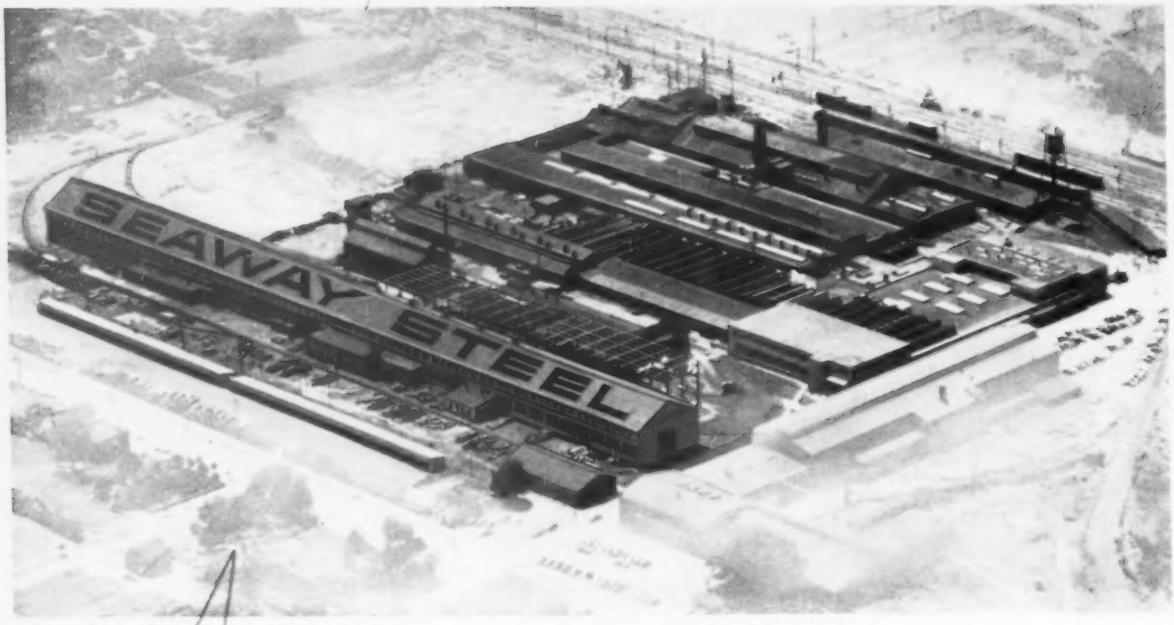
Talk it over with a Niagara sales engineer. He has the facts to give you a fair comparison **...on every point.**

77 sizes to choose from

- 15-1500 tons
- Power or Manual Clutch
- Smooth, micro-inching ram
- Wear resistant, non-metallic ways
- Gearing enclosed in sealed oil bath

NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.

DISTRICT OFFICES: Boston • Buffalo • Cleveland • Detroit • Indianapolis • New York • Philadelphia
Distributors in principal U. S. cities and major foreign countries



NEW

ON THE STEEL HORIZON

SEAWAY STEEL

At Seaway, every order, large or small receives the *same* special attention. Our operation is "tailor-made" for the customer who requires . . .

FLEXIBILITY... Bars and Rods of any size or shape produced to your specifications, regardless of quantity:

SPECIAL ANALYSIS • SPECIAL SURFACE FINISHES
SPECIAL HEAT TREATING • SPECIAL HARDNESS

QUALITY..... Forging and cold heading. Though our *name* is new, the steel craftsmen at Seaway have worked together for decades, producing high quality steel for cold heading and nut forming operations. Diligent inspection right down the line assures consistent quality.

SERVICE..... Seaway can produce any size Rod or Bar, and under normal conditions *produce it faster.* Every order, regardless of size receives the *same* accommodative service.

ASK US ABOUT A DELIVERY DATE ON YOUR NEXT ORDER!

LUDLOW 9700

SEAWAY STEEL CORPORATION
101 EAST AVENUE • NORTH TONAWANDA, NEW YORK

ARE U. S. BUSINESSMEN DETERMINED to overlook export potential in their market planning? A Dept. of Commerce test of one area shows eager buyers from overseas are actually ignored by manufacturers of products in demand for export.

BUT AUTOMAKERS ARE TAKING A FRESH LOOK overseas. Some are convinced that the market in Europe may be greater than the U. S. Also, countries now under-developed will be future markets. This is leading to a general stepping up of foreign operations.

AS BUSINESS COMPETITION TIGHTENS, so does demand for top sales executives. A leading management recruiting service reports that marketing emphasis has put sales executives at the head of the list. And most positions are new jobs, not replacements.

IN SPITE OF CASTRO THREATS to push U. S. interests out of Cuban nickel projects, no nickel shortage is threatened this year. This means it will not be necessary to revise product planning even if stainless and plated parts are involved.

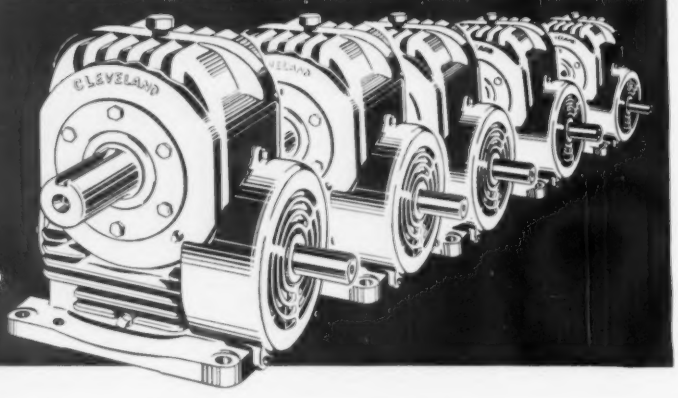
MACHINE TOOL ORDERS PICKED UP moderately in February. Latest figures of the National Machine Tool Builders Assn. show new orders in the month totaled $60.8 million for metal cutting and forming tools. January total was $56.45 million. Biggest gain was in foreign orders, which climbed almost $3 million.

THE NUMBER OF BUSINESSES IN THE U. S. continues to increase. And the Small Business Administration says the rate of gain is higher than the rate of population growth. Business population gained by 81,000 new firms in 1959. Total is 4,684,000.

TREND TO GREATER SPENDING FOR NEW PLANTS and equipment is confirmed in the February report of F. W. Dodge Corp. Heavy engineering contracts are up 5 pct from last year. Total construction contracts in the month totaled $2.239 billion. This is down 3 pct from the same month last year.

SHIPMENTS OF FABRICATED STRUCTURAL STEEL are also on the upgrade. The American Institute of Steel Construction reports that February shipments of 240,850 tons were the highest since last June. Bookings also increased to 288,825 tons, second highest month since last June.

Why do these new Clevelands carry higher horsepower ratings?



It's because Cleveland design engineers — drawing on 47 years of experience — have successfully blended the *just right* combination of housing design, exclusive heat-treatment for alloy steel worms, centrifugal casting of bronze gear rims together with larger, more rugged taper roller bearings on worm and gear shafts.

This permits substantially higher horsepower ratings with smaller worm and gear units — units that more than meet AGMA's new Standard 440.03. Cleveland now offers speed reducers — from one to forty horsepower — at savings of 50% or more on cost per horsepower.

HOUSING is a rugged one-piece design of highest quality cast iron, ribbed for maximum strength and heat dissipation. Cooling fan of unique design is mounted on *input* end of worm shaft and is equally efficient in either direction of rotation. Only one gear shaft bearing plate is large enough to permit assembly of the gear. On gear shaft extension side, gear shaft bearing is mounted in the housing bore and backed up by a clamping plate. This gives a stronger housing and provides maximum strength for overhung loads. Housings are designed for mounting in one position only, thus avoiding design compromises necessary with *universal mount* types.

BEARINGS on both worm and gear shafts are Timken taper roller-type, providing adequate thrust and radial capacity. Worm bearings are mounted directly in housing bore for greater rigidity.

WORMS are cut integral with shaft and accurately ground to a high surface finish on both thread flanks. Shaft extension diameter is especially large to permit increased overhung load capacity. An exclusive heat-treating technique provides a high degree of hardness throughout the entire thread thickness and well below the worm's root diameter. It gives maximum thread strength and resistance to wear without losing the advantage of a tough core of medium hardness.

GEARS have centrifugally cast bronze rims with a high tin-nickel content. They provide greater density and a higher hardness, giving increased resistance to wear and fatigue pitting. Bronze rims are centrifugally cast integral with cast iron centers, in smaller sizes up to 6 inches, which permits strong mechanical keying of the two parts — without dependence on actual surface bond. Gear shaft extension diameters are especially large to permit greatly increased overhung load capacity.

ORIGINAL MASTER WORMS for each size and ratio of worm gearing, are made individually in Cleveland's tool room to extremely close tolerances and kept in perpetual stock. Cleveland makes all their hobs. No outside source has been found that can produce worm gear hobs to their exacting tolerances and standards. Each hob is checked against this master worm — as are production worms and gears. Thus, it's not necessary to ever replace Cleveland worms and gears in sets. A new gear will operate perfectly with an old worm and vice versa.

Call your Cleveland Representative today, to get all the facts on these new, more powerful speed reducers. Or, write for a copy of new, free Bulletin No. 405 giving complete engineering information.

CLEVELAND
Worm Gear
Speed Reducers

Cleveland Worm & Gear Division
Eaton Manufacturing Company
3282 East 80th Street • Cleveland 4, Ohio

Nickel Shortage Is Unlikely Despite Castro Threat

Moa Bay operation suspended and Nicaro is uncertain under new Cuban mining laws.

But nickel supply pinch is unlikely in spite of threat to a 100 million lb annual capacity.

■ The Castro government in Cuba is playing a tough hand with the island's nickel resources.

At stake is the island's capacity of 100 million lb of nickel and eventual control of the two U. S. owned and operated facilities.

These are the $75 million Moa Bay plant of the Freeport Nickel Co. and the $85 million Nicaro operation owned by the U. S. government and operated by a subsidiary of National Lead Co.

Some Negotiation—As it stands, Freeport is in a state of uneasy negotiation with the Castro government, with no apparent conclusion in sight. The Nicaro plant is operating and has been operated consistently. But, with the unpredictable Castro, the U. S. government won't make any predictions of what the future might bring.

The situation is serious to those involved — particularly to Freeport Nickel and the companies that helped finance the project. These include Bethlehem Steel Co.; Jones & Laughlin Steel Corp; Republic Steel Co.; McLouth Steel Co.; General Motors; and Ford Motor Co.

Shortage Not Likely—But to the major nickel users, the caprices of the Cuban government are not likely to bring on a nickel shortage. A. P. Gagnebin, vice president—manager, Primary Nickel Dept. of International Nickel, says that even without Cuban nickel, there will be enough to meet U. S. demands throughout all of 1960.

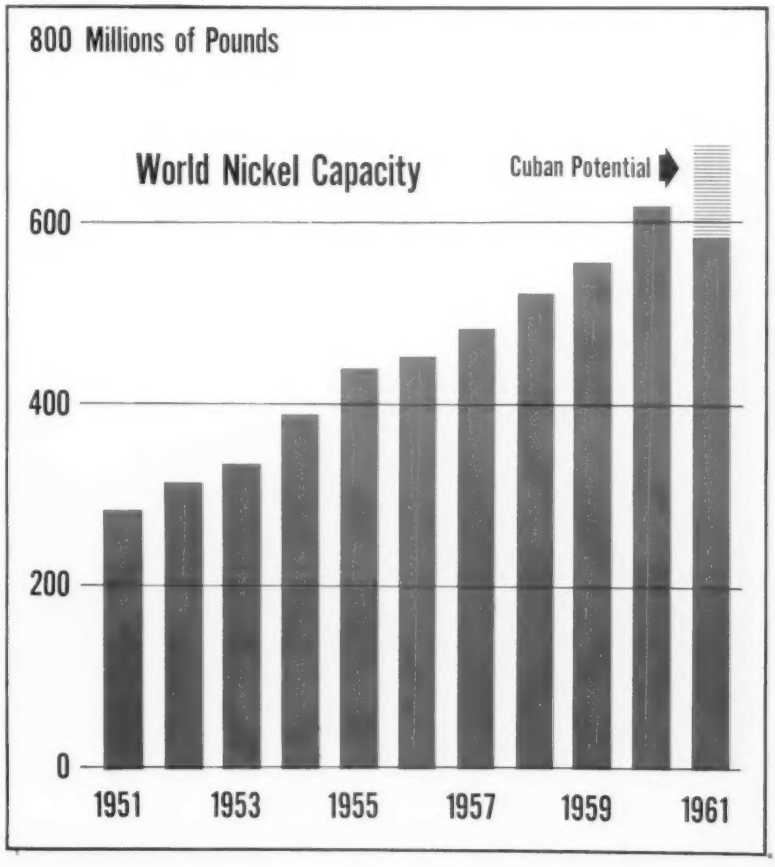
And by 1961, Inco's $175 million Thompson, Manitoba, plant in Canada will add another 75 million lb to annual capacity. Furthermore, even if Castro did oust U. S. interests entirely, Cuban nickel would find its way into world markets.

Users Unworried—Major users of nickel, the steel companies, are not concerned about supplies for stainless steel production. And automakers, the big users of stainless steel as well as nickel for plating, are also unconcerned.

"The way the stainless business is going, a nickel shortage is the least of our worries," says the purchasing agent for one specialty steel producer. "I see no worries for 1960."

For a pinch to develop, there would have to be sustained demand at the level of January and December. At that time, stainless was being produced at capacity and nickel was

How World Nickel Supply Looks



being consumed faster than it was being produced.

Supplies Good—On the basis of current business, stainless operations could drop as low as 50 pct of capacity before recovering.

Even with a return to capacity demand, it would take a long time for consumption to produce a pinch. This country has a year's supply of Nicaro sintered nickel oxide (90 pct nickel), which can be used for a part of the stainless need.

In addition, the government stockpile is considered excessive by some. Inco is now buying some nickel from the stockpile and wants to avert the dumping of large stockpile quantities.

Detroit's View—A check of the major auto companies shows little, if any, concern over a nickel shortage. In Detroit, the major concern of nickel salesmen is an increase in nickel applications.

One estimate is that about 5 lb of nickel goes into the average car or truck. Primary use is in plating, in stainless trim, and in some functional parts. And at least one auto producer is cutting down on stainless and going more to aluminum. But around the industry this is a continuous battle of materials.

Castro's Aim—How tense is the situation back in Cuba?

It's apparent that Prime Minister Castro is after Freeport's mine and concentrator. With it, and the 50-million-lb Nicaro plant, he could control the world's second largest source of nickel.

The Freeport picture is unusual in one respect that makes it difficult for Castro to move forcefully. Freeport Nickel turns ore into concentrates which are shipped to Louisiana for further processing. This refinery now is the only plant equipped to handle the concentrate in quantity.

On the other hand, the Louisiana refinery would be relatively useless without the Moa Bay facility—unless another source of that type of ore is developed. It's been established that Freeport is now taking a look at Puerto Rico, where the company previously considered mining and concentrating.

Tax Freezeout — Freeport suspended operations after adoption of a new law which provides for a 5 pct tax on the value of all minerals taken from the ground and a 25 pct tax on the "highest annual average quotation registered in the world markets." There is also a levy of $10 per year per hectare (2.47 acres) on the company's 30,000 hectares. Freeport had been temporarily exempted from a 45 pct tax on profits.

Under these taxes, compounded by uncertainty on the future, the company suspended operations.

At Nicaro, the plant is run on what the General Services Administration calls a "government-to-government" agreement.

Uncertain Future — When the Castro regime imposed the 25 pct tax on exports, GSA held up one shipment in December. Castro then said he would not impose the tax for at least 90 days. This 90 days was up March 13. Another shipment is due soon, so the issue may break then.

Also, when GSA asked for bids on the plant, the Cuban government sent a telegram indicating it would like to submit a proposal. But by last week, GSA had not received any proposal.

Castro has made references to acquiring the plant, but has not said by purchase or by nationalization.

Enter Russia—Another point of concern is the increasing friendliness of the Castro government and Russia. It is contended that Castro could not operate either Moa Bay or Nicaro without U. S. technicians.

Robert C. Hills
President,
Freeport Nickel Co.

"The (Cuban) government has made certain suggestions. . . . We are, of course, giving the most careful attention to these suggestions. But it is too early to tell whether a workable solution can be reached."

Albert P. Gagnebin
Vice President-Manager,
Primary Nickel Dept.,
International Nickel Co.

"I think business is going to be 15 pct better overall this year.

"Even without Cuban nickel, there'll be plenty of nickel to meet demand in the U. S. throughout all of 1960."

But it is suspected that Russian technicians would be made available.

And it could provide a low-cost source of nickel for Russia. This has a double edge in that it would aid in Russia's bid for world trade and it could also threaten world stability of the nickel market and its price structure, a weapon Russia has used in other metals.

As far back as last November, Freeport notified the Cuban government that it could not get the $13.5 million more it needs to complete the plant under the current law.

Waiting for Word—There were a number of meetings, but through last week no conclusions had been reached. Robert C. Hills, Freeport Nickel president, told The IRON AGE:

"When we notified the Cuban government on March 3 that the new Cuban mining law and other developments in Cuba made it necessary to suspend operation of our nickel-cobalt project, we told the government that we were ready to discuss any plan which they may develop for resumption of operation.

"Since that time, the government has made certain suggestions for a solution to the problems confronting the project. We are, of course, giving the most careful attention to these suggestions, but it is too early to tell whether a workable solution can be reached."

Nicaro for Sale—The U. S. government has been trying to dispose of the Nicaro plant for years, but complications have consistently blocked the sale.

Now, with Castro's hostility to U. S. interests and to free enterprise generally, disposing of the plant to a private interest may well be impossible.

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Bethlehem Building H-Iron Pilot Plant

■ Shipment to the West Coast of the huge weldment brings completion of Bethlehem Steel Company's new H-iron pilot plant at Los Angeles one step closer.

The vessel, which will weigh 238 tons when installed, is the heart of a plant designed for direct reduction of iron ore into crude metallic iron. Operation of the new unit is expected sometime this fall.

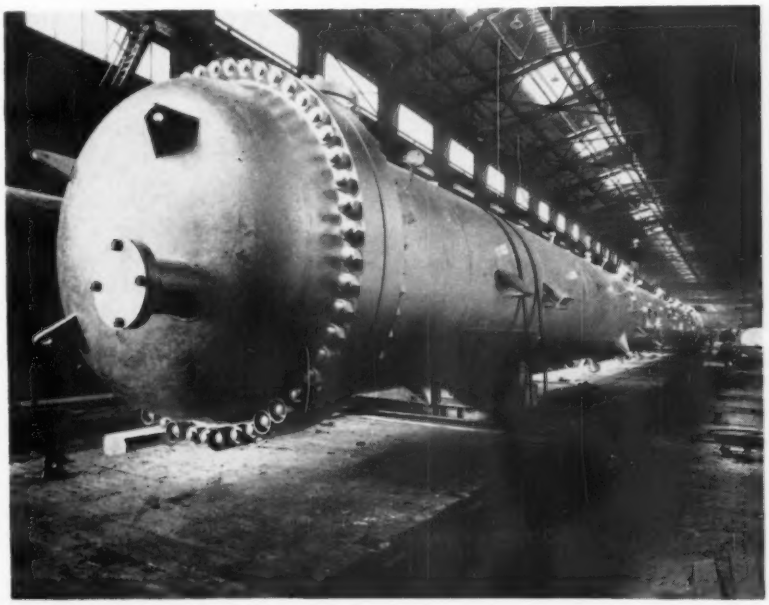
Continued Research—At present, Bethlehem uses cold charge in its West Coast openhearths and electric furnaces. According to the company, the pilot plant is being built "to further advance the research program on the H-iron method of producing steel."

The plant was developed by Bethlehem in cooperation with Hydrocarbon Research, Inc. In the process, pulverized iron ore is converted into crude metallic iron pellets at an estimated rate of 110 tons a day. These can then be charged into electric arc furnaces and turned into steel. (See the IRON AGE, July 12, 1956, "H-iron: Competition for the Blast Furnace?")

Hydrogen Action — The pulverized iron ore enters the vessel at the top and is acted on by hydrogen gas under pressure as it falls to the bottom. The vessel is made of chrome - molybdenum shell plate 2⅛ in. thick. Height is 122 ft., 6 in.

It is designed to operate at pressures ranging from 490 psi at its top to 570 psi at the bottom, and at a temperature of approximately 900°F.

Tested Before Shipment—Before shipment on three rail flat cars, it was hydraulically tested to 1125 psi, using 30,000 gallons of water.



OFF TO THE COAST: Three railroad flat cars were used to ship this large weldment to Bethlehem's new H-iron pilot plant at Los Angeles. The unit was fabricated at Bethlehem's Steelton, Pa. plant.

Why American Steel Companies Search World-Wide for Ore

It's not enough these days to have one, or even two, good sources of iron ore.

World competition for ore sources is a tough, long-range battle.—By Tom Campbell.

■ When Republic Steel's Charlie White sounded a warning of an iron ore shortage back in 1947, even he never dreamed 38 pct of our iron ore receipts last year would be imported. But they were.

And back in 1948 when George Humphrey, then head of M. A. Hanna, and Jules Roberts Timmins, Hollinger Gold Mining head, were scurrying around trying to raise money for a new firm—Iron Ore Co. of Canada—they never thought that by 1960 it would be starting a $150 million ore concentrating project in Labrador. But it's started.

On to Cerro Bolivar—In 1949 when Ben Fairless and his explorer, the late Mack Lake, were congratulating themselves on the fabulous Cerro Bolivar iron ore find, they figured they never would go to Canada as an additional iron ore source. But U. S. Steel has.

By the same token, in 1965 many who are now crying that iron ore is "coming out of our ears" may be singing a much different tune. By that time Republic, Bethlehem, Armco, and Youngstown Sheet & Tube, who all have been putting their eggs in more than one basket will be sitting pretty.

But today, as the spectre of serious competition from steel firms abroad darkens the long-term steel earnings picture (if labor costs keep rising), foreign ore is a chief raw material for American mills. And there appears to be no change in this picture.

It's Up to the Governments—Yet the future of iron ore exploration, mining, shipping and consumption remains with governments and their taxing authorities. If the Province of Quebec or Newfoundland should decide at some future date to inordinately raise taxes, then the flow of world iron ore might be slightly changed.

Should the government of Venezuela decide that iron ore is something that can be taxed without fear of shifting demand for Venezuelan ore, that too could change the flow. Down in Africa, where President William A. Tubman of Liberia holds forth after a 16-year tenure (he is serving another four-year term), any basic change in his forthright and free enterprise techniques could also mix world iron ore production around a little.

The Ore Story

Since 1948, IRON AGE's editor-in-chief **Tom Campbell** has followed the world ore story. Since the first of the year, he has visited iron ore projects in both Venezuela and Canada.

A World Problem—Also, there is no room even for the governments of Michigan or Minnesota to irresponsibly lay on the heavy hand of taxes. It isn't that the steel companies or mine operators don't want to cooperate, become "sympatico," do their duty in the States, or carry on a good neighbor policy with Canada. It's just that the iron ore problem is a world problem delicately balanced between powerful forces: Nationalism, need for taxes, lack of U. S. open pit ore, growing pains in Canada, and factors not yet plainly visible—including an explosion in steel demand by the 1970's.

This is a major reason why Iron Ore Co. of Canada is shaping final plans for its Carol Lake project in Labrador. From there, concentrated ores will be shipped to Mile 225 on the Quebec North Shore and Labrador RR, down to Sept Iles on to regular customers of Iron Ore Co. of Canada. This will start by 1962.

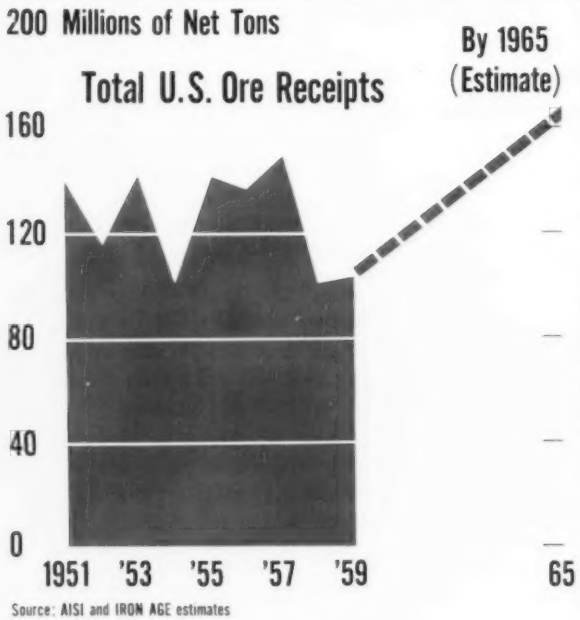
Canadian Projects—U. S. Steel's Quebec Cartier (now having its first go-around with problems far different than those in sunny Venezuela) will be shipping its concentrated product to U. S. Steel plants sometime early in 1961. Total shipments from Gagnon, P. Q., 190 miles north of Port Cartier (below Sept Iles on the north shore of the St. Lawrence River) will reach nine million net tons a year when its target is reached.

In the same general territory as Carol Lake, Wabush Iron Co. will probably be shipping high grade concentrate by 1965 or soon thereafter. With Pickands Mather as the organizer and shipper, Youngstown Sheet & Tube, Interlake Iron, Steel Co. of Canada, Pittsburgh Steel, and perhaps others will be consuming concentrates.

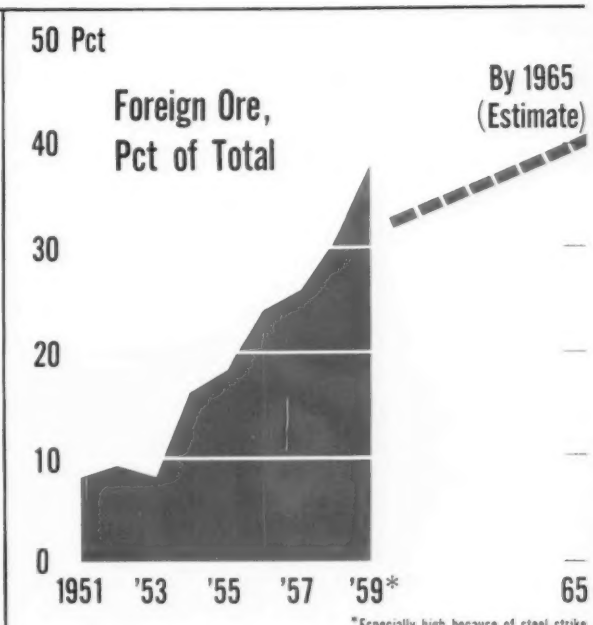
Wide Range of Sources — Outstanding in the foreign ore picture is the diversification of various owner-consumer sources. Take Republic for instance. Today its ore comes from Quebec, Liberia, the Adirondacks, Lake Superior, Alabama, and later it will take ore from Lake Carol. Probably it already has new ideas of supply for the years 1965 and onward.

Bethlehem Steel, which "looked in" on Iron Ore Co. of Canada some years ago as a customer of M. A. Hanna, is now part owner of this project. And it will be a partner in the Labrador Carol Lake project. But Bethlehem also mines in Vene-

Foreign Ore: A Bigger Share of a Bigger Market



Source: AISI and IRON AGE estimates



*Especially high because of steel strike

zuela, other South American countries, buys from Orinoco Iron Ore Co. in Venezuela, and has a 25 pct chunk of LAMCO in Liberia.

The company is involved in Mekambo in West Coast Equatorial Africa, has interests in Lake Superior (open pit and taconite) and has mines in eastern Pennsylvania. It is a prime example, like Republic, of having more eggs in more baskets.

LAMCO Project — The big LAMCO project (75 pct of the concession to Swedish-American-Canadian interests and 25 pct to Bethlehem) is about to get underway. It is in Liberia—fairly far inland. Project calls for a 165-mile railroad, harbor and townsites.

The ore is 60/63 pct Fe (natural) and will compete in world markets with Orinoco and Canadian ores. Most of the ore not allocated to Bethlehem will be sold by a Swedish firm to German steel mills and to other potential customers. Some are perhaps in the U. S.

Adequate, Now—At present the supply of world iron ore is substantial. This very large supply keeps the price from going up in the U. S. Foreign competition has effectively frozen ore prices despite the squeeze play on ore firms in the Lakes regions. These sources have not recovered wage and fringe costs increases in recent years.

Any effort by U. S. manufacturers or steel firms to get tariff protection against foreign imports would cause a first class upset in the ore picture. With American steel firms bringing in close to 40 pct of their ore requirement, it is unlikely that steel firms will be counted in an embargo corner—if, indeed, there ever should be one. But having so many different ore sources has been canny foresight. In case of any kind of trouble, American steel companies can quickly step-up their "take" from other areas.

The Future—However, old-time mining engineers who have absorbed South American, African, or Canadian culture and thinking, have quite a different story to tell. Their conclusion is that nationalism is on the march. Also, it is clear to Canadians that the Americans from the States have exported higher wages and fringes while they have imported the ore.

As time goes on, it is certain that the taconite experts knew what they were doing. Even though initial costs were high, the time may come when annual pellet output in the U. S. will be from two to four times what the experts thought it would be less than a few years ago. And, if you look close, you will find that every one of the American steel companies with foreign ore sources likewise have one or more sources for American pellets — and is quietly planning more capacity.

One thing is certain in ore: Competition will be world-wide and it will be rugged. Americans don't necessarily have the edge, even though they do have the multi-egg-baskets.

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What's New in Production?

Latest Developments Revealed at SAE Forum

Details on Chevrolet's aluminum engine foundry were given for the first time.

Many metalworking production problems and techniques were discussed. — By T. M. Rohan.

■ Engineers traded information last week on the latest metalworking production techniques. Topics ranged from aluminum foundry practices and automation in the job shop to polishing stainless steel sheet and electro-chemical milling. The occasion was the annual production meeting in Cleveland of the Society of Automotive Engineers.

Chevrolet used the occasion to take some of the wraps off its Massena, N. Y., aluminum foundry which makes castings for the Corvair engine. R. C. Walter, an official of the foundry, described some of the operations.

The foundry is currently shipping in excess of 3 million lb of castings per month. Parts include cylinder heads, manifolds, crankcases, camshafts, and smaller parts.

Update Old Process—Scrap rates vary with complexity of the part. On cylinder heads, the most difficult casting, the loss is under 10 pct. On some other parts it is as low as 2 pct. Three alloys are used; 380, 356, and F132, the latter for pistons made by conventional permanent mold.

The basic casting process for larger parts is low-pressure, permanent mold. An old process, it has been modernized for mass production of engine parts.

How It's Done — The casting machine was designed by General Motors. But it was adapted from equipment in a German foundry, Karl Schmidt of Hamburg.

Major advantage of the system is that risers and gates are nearly eliminated, reducing the as-cast weight. A big disadvantage is the castings must be cooled slowly.

In the process, molten aluminum is held in a reservoir under the machine. For casting, it is forced up a central pipe by 3 to 6 lb of air pressure on the chamber—just enough to get it up to fill the cavity.

Points Made in the Sessions

Tape Controls

By 1965, up to 60 pct of all new machine tools will have automatic controls. Job shops will be able to get into the field with a low-price imported control using 5-channel tape which will sell for about 30 pct to 40 pct less than U. S. types.

Cutting Tools

New, super high-speed steel for cutting tools, due later this year, will boost tool life 50 pct to 100 pct. A higher "weld-on" temperature will permit higher speeds. Price will be about the same as conventional carbides and it will come out in inserts also.

Precision Forging

In precision forging, one part requires only 290 lb of material for a finish-machined 230 lb casting. Block forging would require 680 lb, and hand forging the same piece would require 1400 lb.

Parts Forming

Cold extrusion of parts from steel or aluminum is proving itself on the job. It's expected that within 10 years it will be integrated with other processes, eliminating many primary and secondary operations.

Electro-Chemical Milling

This process is getting wider use. It is being used for weight shaving on production steel forgings, milling pockets in sheet stock. It can also be used for tapering or perforating sheet stock.

Belt Polishing

Split-line polishing is new for stainless steel sheet bumper stock. Tough spots get a second going over by reversing the flow of coils under polishing rolls.

Tape Controls—From a session on tape controls for job shops it was learned that a new, low-price imported control will sell for 30 pct to 40 pct less than U. S. types.

The new tape unit will have five channels. However, 8-channel tape has become the standard for U. S. aircraft work, as set up by the Aircraft Industries Assn. And the bulk of the machine control business is in aircraft work.

But the new import would permit job shops to get into the business cheaper although they would have a problem in doing aircraft work.

Trend to Tape—As it stands, job shops with tape control machines are now getting tapes from prime contractors and are in effect selling machine time. This business is expected to grow fast.

A new Auto-Prompt system of programming with an IBM 704 computer took 200 man-years to develop by 24 aircraft firms. But

it cuts programming from weeks of work, and 50 pages of notes, to one page taken off the part drawing. In programming the machining of a 160-operation pump casting lead time was slashed from four months to three days and $100,000 was saved in tooling costs.

Cutting and Forging—"A new super high speed steel for cutting tools will be announced later this year with 50 pct to 100 pct improvement in tool life," said R. T. Hook of Warner & Swasey. He also said it will permit higher speed due to higher "weld-on" temperature. Price would be about the same as carbides and it will come out in inserts also.

In precision forgings, one company reported it required only 290 lbs of material for a finish-machined 230 lb casting. A block forging for the same finished weight required 680 lb, and an old hand forging took 1400 lb.

Polishing and Milling—New developments in stainless sheet polishing outlined by Adam Zimmerman of Acme Mfg. Co. Detroit, are split-line polishing of stainless sheet bumper stock and reversing flow of coils under polishing rolls to make a second pass at tough spots. He added that standards are sorely needed to end hassles between steel suppliers, polishing firms and final users.

Electro-chemical milling is still expanding, according to Arthur Watson of Cleveland Pneumatic Tool Co. The process is now being used at Cleveland Pneumatic for weight shaving on production steel forgings and milling pockets in sheet stock. It can also be used for tapering or perforating sheet stock.

Cold Extrusion — Cold extrusions has come a long way in the past 5 years and in parts forming, the advances have been spectacular.

Harold Bogart of Ford Motor Co. said his firm has formed about 40 million piston pins this way since 1955.

Equipment Sale Tax Plan Dies

House committee kills Treasury Dept.'s plan to revise tax rules on equipment sales.

Depreciation, and all other tax revision plans, will now wait until 1961.

Provision had little support, and there was no sentiment for a tax bill in an election year.

▪ The U. S. Treasury Department's plan to tax gains from sales of depreciable property as ordinary income has been put in mothballs. The mothballing was done by the House Ways and Means Commit tee.

The committee decided to shelve the Treasury plan until it takes up a broader study of possible revisions in the tax rules covering depreciation. Time for the "broader study" has not been set. One thing for sure, it won't be during this election year.

No Surprise — The committee's action comes as no surprise. The depreciation reform bill went the way of all tax bills—on the shelf until 1961, when election-year tempers subside.

Ways and Means Chairman Wilbur D. Mills D., Ark., said last year that depreciation would be one of the subjects of a vast re-examination of the nation's tax structure. He has continually set 1961 as the date for the revamping.

The Provisions—Then, out of the blue, came the Treasury Department's bill. The plan was designed to change the tax laws for the sale of depreciable property such as machinery, trucks and other such equipment.

The Treasury proposed that businessmen selling such property for a price above the depreciated book value would pay ordinary income tax rates on the difference between the depreciated value and the sales price.

Give and Take—For most companies, that would mean a maximum 52 pct tax rate. At present, the law taxes such gains as lower capital gains rates up to a maximum of 25 pct.

The Treasury Dept., in exchange for raising the taxes on gains from sale of business equipment, offered to ease the impact. It promised if the change were made, revenue agents would be more lenient on businessmen. The T-men would allow businessmen to depreciate new equipment more rapidly. This would allow the businessman to deduct larger amounts from his taxable income each year.

Little Support — The trade of higher taxes for more liberal collecting didn't sit too well with some committee members. Nor did business groups attending the hearings on the Treasury proposal earlier this month like it.

Opposition—For example, Joel Barlow, chairman of the U. S. Chamber of Commerce's tax committee, urged rejection of the bill unless it is coupled with sweeping "reform" of depreciation rules.

Since the Committee had no intention of going into a wholesale depreciation revision this year, despite some extensive hearings earlier, the Treasury Dept.'s measure had little chance.

The business groups argued that something should be done to ease depreciation taxes.

The Committee didn't commit itself for higher or lower taxes on depreciable property. But it held fast to its schedule. Depreciation—and all other tax measures—1961.

How Taxes Influence Planning

Their Impact Can Turn Profit into Loss

How logical a business decision is may depend on how it looks "after taxes."

Managers at Rockwell Manufacturing study the situation carefully before taking any action.—By G. J. McManus.

■ With the Federal tax bite now topping $20 billion a year, tax angles in business planning must be checked at every turn.

That's the way it looks to one Pittsburgh manufacturer. W. F. Rockwell, Jr., president, Rockwell Manufacturing Co., feels taxes have introduced a new element in business management.

"No manager can make intelligent decisions without at least a working knowledge of federal, state and other possible tax costs in his area," says Mr. Rockwell.

After Tax View—Managers are not expected to understand all the intricacies of tax law, he adds. "But we do expect them, in considering any proposed course of action, always to raise—and find an answer to—the question: What does it look like "after taxes."

He points out this knowledge can revise management values.

"Decisions based on what appears to be extremely logical thinking may very well prove to be illogical, and costly, when the net 'after taxes' is considered."

Deepening Cut—Tax totals indicate the need for special logic is increasing steadily. State and federal taxes on corporate income were about 15 pct of gross profits in 1929. These same taxes were 40 pct of gross profits from 1946 to 1950. In recent years, the tax slice has been averaging close to 50 pct of profits.

For individual companies, the tax trend has made government payments an important item. Rockwell's taxes for 1959 were $12.4 million. This was equal to $3.59 a common share or 2½ times the common dividend.

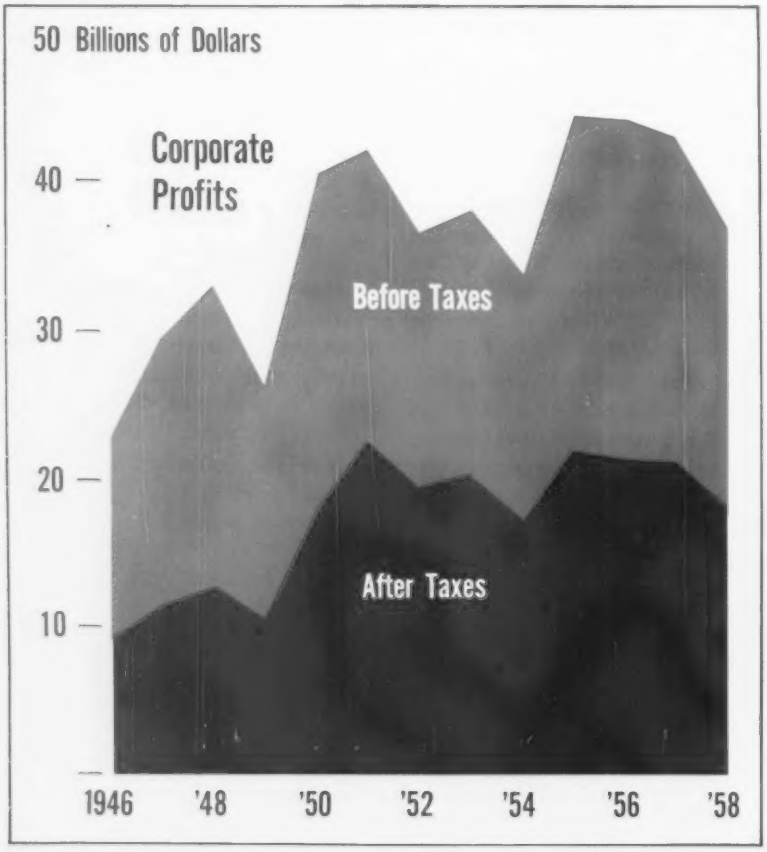
These figures add up to a tax load that can turn profit into loss or vice versa. Munro Corbin, staff vice president for Rockwell, cites situations where it has been more profitable for the company to give idle plants away rather than sell them.

However, says Mr. Corbin, tax considerations will usually have the effect of changing procedures rather than basic decisions. For example, in selling voting machines to municipalities, Rockwell follows the accepted practice of collecting by installments. Finance charges make up part of total collected. These charges are tax free if a proper sales agreement is drawn up.

How to Buy Plants—The same kind of technicality can make a big difference in acquisitions. Recently one company was taking over the facilities of another. Instead of buying the assets of the second company, the principals acquired stock ownership.

But the method followed left a

Taxes: A Big Bite of Profits



plant with exhausted depreciation charges. If the transaction had been a straight purchase, the full purchase price could have been depreciated.

Watch Deliveries—On questions of inventory and manufacturing, taxes will not normally bring major changes. Rockwell keeps track of personal property assessment dates. If there is enough leeway, deliveries are scheduled after the reckoning time. However, the company would never dislocate production, just for tax purposes.

In foreign operations, taxes entered into Rockwell's decision to locate its international company in Switzerland. That country offers a favorable structure; corporate income taxes there can total as low as 12 pct. However, company officials warn that the tax angle can be overemphasized.

Check Thoroughly—"Favorable commercial and tax laws lose their significance if income is penalized by a geographic location chosen from these considerations alone," says G. T. Bowman, vice president, international operations.

Mr. Corbin points out, too, that U. S. companies must have a legitimate foreign operation to take advantage of tax differentials. Sham companies are not recognized by the internal revenue department.

"You must choose a man you can trust and give him full power to make operating decisions," says Mr. Corbin.

Leasing Used—New plant construction has been a major concern of Rockwell in recent years. The company has added 10 domestic plants since 1950. In most cases, the actual building is done by local groups. Rockwell then leases the plant, paying rent that gives investors a rapid return on their outlays.

This method has the advantage of not tying up company funds. Also the cost of the plant is written off as rent in a much shorter period than would be possible under ordinary depreciation methods.

SPACE AGE MIDGET: A Radio Corp. of America technician holds a tiny nuvistor, electron tube for miniaturized airborne apparatus and space vehicles at IRE Convention.

Radio Engineering Serves Metalworking

Each year new developments more closely relate radio engineering to the metalworking industry.

More and more industrial uses for new concepts are constantly being uncovered.

■ Radio engineering is now a closely related industry to metalworking. Proof was the array of products and developments displayed at the 1960 international convention of the Institute of Radio Engineers in New York last week.

Although few new basic concepts were in evidence, the application to practical industrial use of some relatively new developments showed how far equipment makers can go once a product is proven.

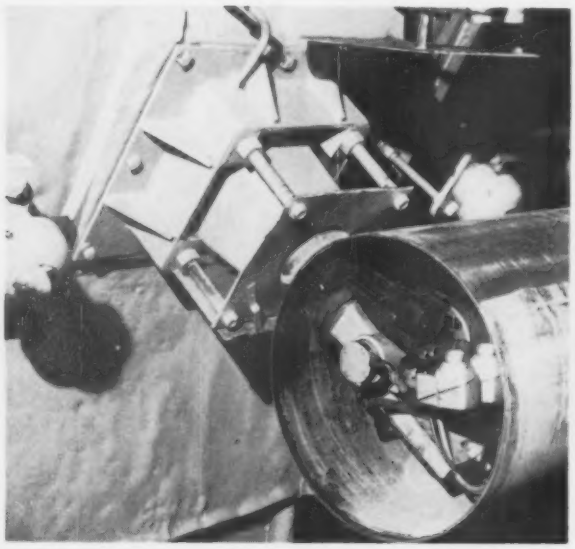
Sound Waves — Ultrasonics is one good example. Introduced about six years ago, ultrasonics now has a number of uses in industry. At the convention, there were more than a dozen different displays of ultrasonic equipment designed for industrial use. One big use is cleaning.

Wide Line — Westinghouse and Harris Transducer Corp., Woodbury, N. J., offer wide lines of cleaning equipment. On the market are units ranging from one piece to many parts with portable tanks varying in size from 1¼ to 10 gal.

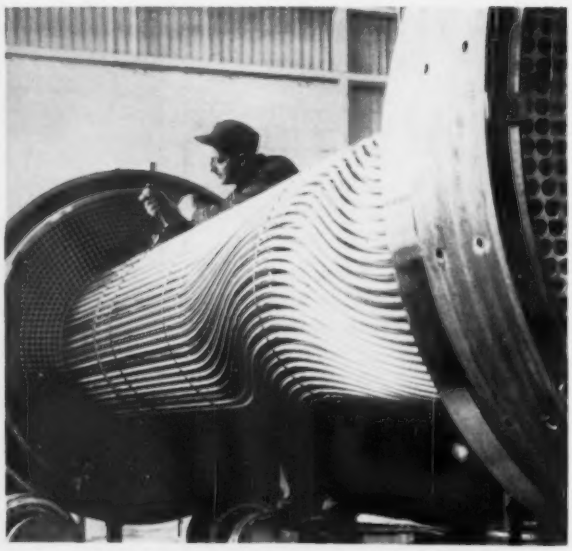
Smaller and Smaller — Photocircuits Corp., Glen Cove, N. Y., is now producing printed circuits in layers, laminated with heat and pressure. A typical six-layer circuit sandwich is only .026 in. thick, the company says.

Miniturization, too, played a big part in the display areas. On exhibit were: A hermatically sealed switch weighing less than 1/28 of an ounce, a 100-tube digital computer the size of a cigarette pack, and gold contacts for transistors 99.999 pct pure and so small that thousands can be contained in a thimble.

New Developments for Steel Pipe and Tube



INSIDE LOOK: The X-ray head of a continuous fluoroscoping inspection unit is shown inside a section of welded steel pipe. The unit, in operation at U. S. Steel's National Tube Div., permits an inspector to check an entire length of weld. A fluorescent picture of the weld is transmitted to a television screen inside an inspection booth.



HOT CURVE: Sine curve tubing is installed in the Alco heat exchanger for the Enrico Fermi Atomic Power Plant, Monroe, Mich. The stainless steel tubing was supplied by Allegheny Ludlum Steel Corp. Alco curved the tubing. Three heat exchanger bundles are being built for the power plant.

Great Lakes Develops New Pipeline Steels

A new family of high strength weldable steels for pipeline applications will be made and marketed by Great Lakes Steel Corp., division of National Steel Corp.

Advantages claimed for the new steels are high strength and ease of welding at the mill or in the field.

"Their ability to reduce field welding and pipe fabrication costs, tonnage requirements and freight charges fit these new high strength steels comfortably into the natural gas industry's need for better pipeline construction economics," says Wilfred D. MacDonnell, president of Great Lakes.

Columbium Treated—The company points out these GLX-W steels are weldable during sub-zero temperatures, without the need for any pre-welding preparation or special welding techniques.

The GLX-W steels are a group of high strength, fine grained, semi-killed mild carbon steels—treated with varying amounts of columbium.

The pipeline market is important to the steel industry. Natural gas transmission lines built this year will require more than four million tons of steel, National Steel estimates. About 14,500 miles of pipe will be laid at a predicted cost of $1.8 billion. A total of $12 billion has been earmarked for transmission pipeline construction in the years 1959 to 1970.

Reynolds Appeal Denied

The Supreme Court has refused to review a state court decision that may cause severe legal problems for industries which spread industrial waste.

The high court declined to review an Oregon court ruling that fumes, gases and particles escaping from a Reynolds Metals Co. plant and settling on surrounding land constituted trespassing by the company.

"Land Unfit" — Neighbors of Reynolds' Troutdale, Ore., plant took the company to court, claiming the waste made their land unfit for grazing cattle. The state court awarded damages.

A Reynolds spokesman said the ruling will put "a staggering burden on national defense industries and industries basic to the economy."

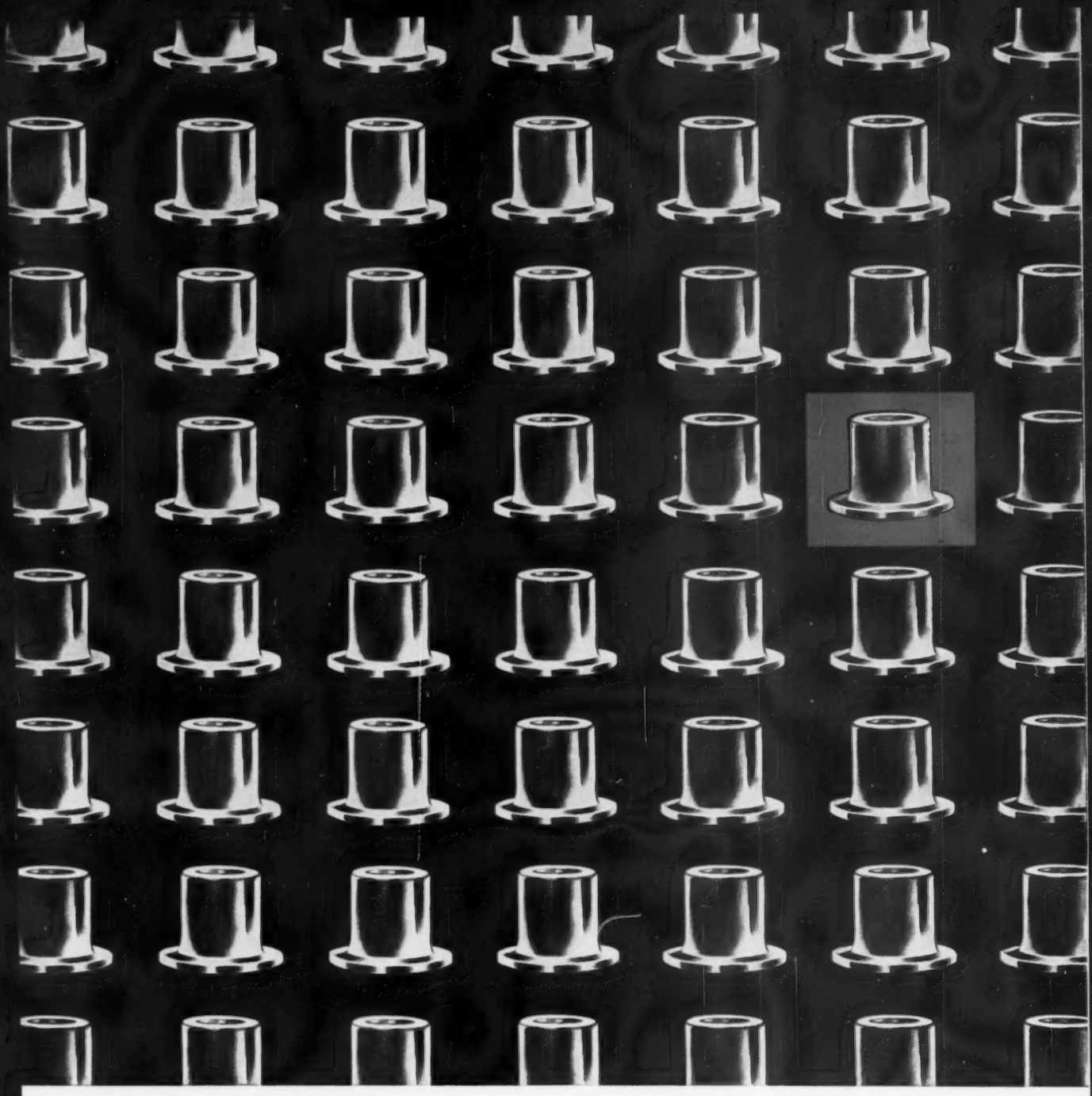
Steel Exports Up

Exports of steel mill products in January continued their recovery from low levels reached during the steel strike.

At the same time imports dropped, the Business and Defense Services Administration reports.

January exports totaled 158,000 net tons. This is a 28,000 ton increase over December, but 19,000 tons below January, 1959. Main increases were in rails, sheet and strip, and pipe and tubing.

Imports dropped to 465,000 tons. This is well below the record 539,000 tons in December. But it is still the second highest monthly tonnage on record.



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THE IRON AGE SALUTES

H. E. Martin

His Chemicals Aid Metalworking

H. E. Martin, president, Metal & Thermit Corp., has done a great deal to associate the chemical industry with metalworking.

About 80 pct of his firm's production ends up in metalworking plants.

▪ "It's amazing—to me, at least," muses H. E. Martin, "that an old boiler salesman like me could end up running a chemical company."

The two decades the "old boiler salesman" spent as field engineer and district manager of Babcock & Wilcox Co. have proven a sound background for his present job as president of Metal & Thermit Corp., New York. His executive abilities have brought M&T's gross sales from $27 million in 1954, when Mr. Martin took over, to more than $40 million in 1959.

Narrow Gulf—And the gulf between Metal & Thermit and metalworking is much narrower than his jokes would suggest. M&T is a chemical company, but 80 pct of its sales are to metalworking. The company serves metalworking from literally one end to the other: Its premium quality No. 1 bundles (a byproduct of its detinning division) are snapped up by steel mills. Other divisions produce essential chemicals for the most advanced electroplating, plastic coating and metal finishing operations.

H. E. MARTIN: A cattle breeder and his champion.

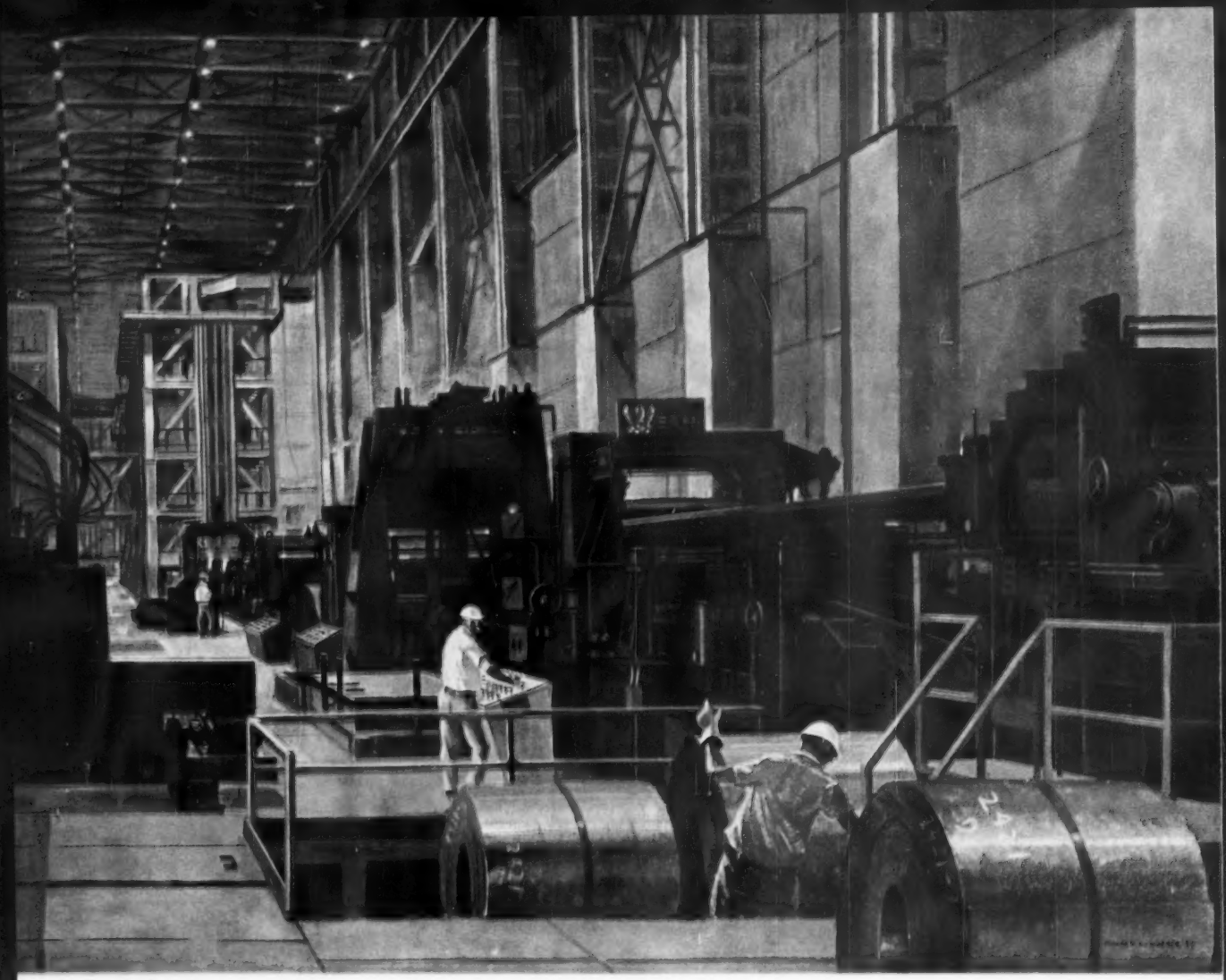
To a multi-faceted company like M&T, Mr. Martin brings a variety of skills and experience in sales, administration and engineering. Competitors find no letdown in the aggressiveness that first showed up as a top sergeant in the U. S. Army Tank Corps in World War I.

New Yorker — His technical background is no less formidable: A born New Yorker, he is a product of Brooklyn's famed Polytechnic Institute and holds a professional Engineer's license from New York State. He is also a life member and past director of American Society of Mechanical Engineers and a trustee of United Engineering Trustees and the Engineering Foundation.

Reflecting his technical background, he has not hesitated to commit Metal & Thermit to large-scale research, both independently and in cooperation with customers. The duplex chromium plating process and the plastisol dip coating method are just two outgrowths of this investment in research.

Cattle Man—A conversationalist and raconteur, Mr. Martin has well-balanced interests. His diversified memberships reflect his range of business and leisure interests, and include New York's Union League and Pinnacle clubs, plus St. Regis Hunting & Fishing Club and Millbrook (N. Y.) Golf & Tennis.

But his proudest memberships are the several Hereford Associations reflecting his interest in his Valleyfield Farm at Dover Plains, N. Y. Here, when time permits, Mr. Martin and his wife concentrate on raising livestock, including an average of about 100 head of prize Hereford cattle.



Entry end of No. 4 continuous galvanizing line, Weirton Plant, Weirton Steel Company

Wean, Weirton and Galvanizing . . .

Weirton Steel Company, Division of National Steel Corporation, added this continuous hot-dip galvanizing line to meet the demand by customers for fine quality zinc-coated sheet. This line was specifically designed to process heavy gauge strip in widths up to 50″, extending Weirton's coverage of finished sizes.

The Weirton line handles 65,000 pound coils and provides for either recoiling or shearing operations at the exit end. Shear lengths vary from 48″ to 192″. A horizontal cleaning section provides superior cleaning of the strip. Six bridles maintain continuous tension regulation throughout the line, permitting a wider range of gauges. Weirton's new galvanizing line is an example of Wean's *creative engineering*, oriented to solving a company's expansion needs. Why not take advantage of Wean's years of experience in your planning to meet expanding demand for galvanized products.

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Are Export Sales Overlooked?

Some firms may be able to land export sales without setting up offices overseas or conducting sales drives.

Commerce Dept. spot check in one city shows opportunities are ignored when overseas representatives visit the U. S.

■ Is your company overlooking opportunities for export sales? Increased business abroad may not require setting up a foreign branch office. And it may not mean an intense sales campaign. All that may be lacking is more initiative and energy here at home.

A recent Dept. of Commerce test in the Miami area suggests how some U. S. companies may be missing the boat. Commerce officials there made up a list of Miami firms who did not export. Then they compared the list with the foreign trade opportunities given in the Department's Foreign Commerce Weekly.

Willing Buyers—Potential customers for the Miami products were found in Venezuela, Trinidad, Great Britain, France, Germany, and Lebanon. Companies there either wanted to buy or act as agents for the U. S. products.

In some cases, the would-be buyers actually had agents in this country looking for sources of supply. Included among the Miami manufacturers was a maker of power saws. When the list was compiled a French representative had just left the U. S. after spending twenty days looking for new lines of power equipment.

Spark and Spunk — Commerce Dept. officials are always eager to aid American producers in locating foreign markets. But they point out the interest must begin with the companies themselves.

Hard Sell for Trade—Commerce officials are cooperating in the new national trade program just announced by the Administration. It's a hard sell campaign designed to promote exports, sell more American products, and create more American jobs.

In the National Export Expansion Program, the government will improve and expand its services to industry in developing world trade and finding new markets overseas.

Included are: Plans to strengthen the trade promotion services of the Dept. of Commerce, including field offices in the U. S. Greater emphasis and a higher priority on commerce activities by U. S. Foreign Service officers. Establishing new overseas trade centers. Faster reporting of trade information useful to U. S. exporters. Greater promotion of U. S. products through international trade fairs and trade missions. A new program of guarantees of non-commercial risks for short-term export credits.

More Sales Managers Wanted

■ Employment opportunities for managers change with shifts in the economy.

When times are good, companies, straining to increase output, look for capable production managers. But in times of peak competition, the call goes out for strong marketing, advertising, and sales managers.

Sales Openings Lead—This trend is pointed up in a survey just completed by the Executive Manpower Corporation, New York. Among 365 executive jobs available, the study shows, the largest percentage are for sales executives. Next come engineering managers and then production-manufacturing specialists.

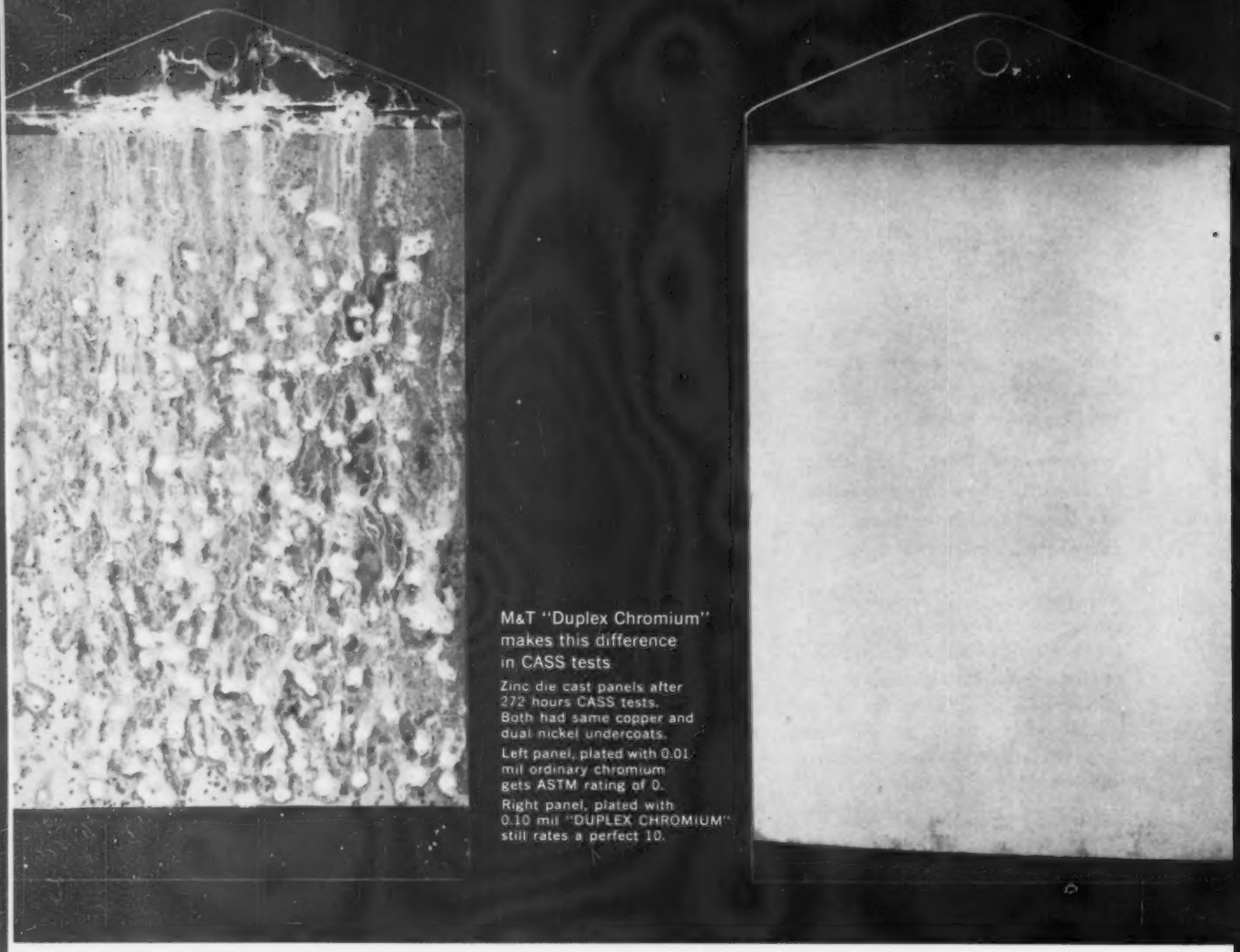
These results are a switch from last year's poll when large corporations said their prime need was production executives. Engineering managers were second with sales management men third.

Marketers in Demand — Also more in demand in the first half of 1960: Marketing or advertising executives. This group, which accounts for only 11 pct of the total need, showed an impressive climb over 6.6 pct last year.

U. S. Foreign Payments Rose During 1959

The U. S. deficit in international payments in 1959 was $3.7 billion, the Dept. of Commerce reports.

This payment to foreign countries showed an increase of about $300 million over 1958 totals. The increase was due mainly to a $2.5 billion rise in U. S. payments for goods and services. U. S. exports of goods rose by $150 million last year. But this provided only a small offset against the import totals.



M&T "Duplex Chromium" makes this difference in CASS tests

Zinc die cast panels after 272 hours CASS tests. Both had same copper and dual nickel undercoats.

Left panel, plated with 0.01 mil ordinary chromium gets ASTM rating of 0.

Right panel, plated with 0.10 mil "DUPLEX CHROMIUM" still rates a perfect 10.

The thicker the "Duplex Chromium" ...the longer the plating lasts

THE hours that plated samples survive in CASS* tests indicate the life expectancy of the parts in actual outdoor use. Results obtained with this modern, severe corrosion-testing technique prove that M&T "DUPLEX CHROMIUM" radically increases protection. They further show that the *thicker* the chromium plate the *longer* the finish lasts.

Here then is the best way to upgrade durability of decorative, chromium plated automotive and other steel and zinc die cast parts. You'll get a dramatic improvement with a thickness of 0.05 mil M&T "DUPLEX CHROMIUM." And you can provide even more remarkable service life by depositing 0.10 mil.

For plating thicker chromium, Unichrome SRHS® (self regulating high speed) Chromium baths have no equal. They alone give the right *type* of deposit. They not only speed production but also simplify it. M&T "DUPLEX CHROMIUM," using two of these baths, consists of a layer of Crack-Free Chromium topped by another special layer of SRHS® Chromium that minimizes localized corrosion due to tiny imperfections in the basis metal. The Crack-Free Chromium also assures more uniform distribution of the plating, so that recesses, too, get amply thick deposits without graying or burning on edges. Write for technical data or for an M&T plating engineer.

*Copper accelerated acetic acid salt spray test

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Foreign Market to Exceed U. S.

So U. S. Automakers Are Expanding Overseas Operations

One company believes Europe will become a bigger auto market than the U. S. by 1975.

South America, Africa and Australia will help swell world markets.—By A. E. Fleming.

■ The lure of a fast-expanding world market is attracting U. S. auto makers. They're pouring capital and manpower into foreign business. And with reason.

"I'm convinced that between 1970 and 1975, the automobile market in Europe alone will exceed the U. S.," the head of a Big Three car company said recently. "And beyond Europe are the rapidly growing economies of progressive countries in South America, Africa and the Australian area."

Latest available figures show that in recession year 1958, the U. S. slice of world car output narrowed to 49 pct from over 60 pct in 1957 and 1956.

Investing Abroad—While domestic assembly ebbed, however, U. S. subsidiaries and affiliates in foreign countries flowed. Estimates are they were responsible for 20 pct of all cars made in 1959 in West Germany, France, Italy, Belgium, the Netherlands and Luxembourg. Today they're seeking to bolster that figure by investing in manufacturing plants, assembly plants and sales distributorships on almost every continent.

In some cases, U. S. car makers are dispatching groups of financial, manufacturing, engineering and other specialized personnel to help get foreign projects going.

Foreign companies are being recruited and developed in car making skills and techniques in order to build up a bank of parts and equipment suppliers. Millions of dollars worth of machines, fixtures, gages, special tools and other equipment are being imported by foreign countries.

Covers the World—Chrysler, for one, is making sharp moves in this direction. Excluding the U. S., Canada and U.S.S.R., the territory covered by Chrysler's International Operations Group stretches over 31 million square miles.

Chrysler holds a 25 pct interest in Simca of France. Simca assembly spread in 1959 to England, Venezuela, Mexico, South Africa and Australia. This year, the compact Valiant is being built in the Netherlands, South Africa, Australia, Venezuela and Mexico.

In 1959 Chrysler bought into Fabricas Auto-Mex, a Mexico City firm which has been a distributor and assembler of Chrysler products since 1938. Last November, Chrysler assumed complete ownership of

DESTINATION ROTTERDAM: Crated cars are being loaded for rail shipment from Chrysler Corp.'s Wyoming assembly plant in Detroit to East Coast ports where they'll be shipped to a plant in The Netherlands.

CRATING CARS: At the export packing plant auto parts are packed for shipment to assembly plants in 16 countries. More than 24,000 parts are packed in 14 boxes, enough to make 12 automobiles.

Chrysler South Africa Ltd. A Capetown company, it was created in 1958 by Chrysler International and Atkinson-Oates Ltd., maker-distributor of Chrysler vehicles.

Gaucho Serenade—Last August, Chrysler landed a grant from the Argentine government and is investing $15 million to manufacture and assemble Chrysler-designed trucks there.

Chrysler topped off a major move for international business by lining up a full staff at its overseas headquarters in Geneva last September. Key American employes, most with families, live there and in regional office cities of Rotterdam, London, Havana and elsewhere. The company provides financial, technical, engineering, manufacturing, marketing and management aid to associated firms in key world markets.

General Motors has a global network, too. Net investments outside the U. S. were $363 million at the start of 1960. Earnings on the investments equaled about 14 pct of GM's net income last year.

Wide, Wide World — GM has made small cars abroad for many years—the English Vauxhall, German Opel and Australian Holden. Last year, economic growth and mounting production capacities resulted in record sales of GM's overseas-made vehicles. An average of 111,000 persons were working for the overseas operation in 1959—109,000 outside the U. S.

Total vehicle sales by GM's overseas group last year were 802,000. Of these 89 pct were products of the English, German, Australian and new Brazilian subsidiaries.

Room to Grow—There's plenty of growth potential, also. GM's planned projects for foreign manufacturing facilities will require over $200 million.

In 1959, GM overhauled its Brazilian subsidiary from truck assembly to truck manufacturing. Additions included a new foundry, engine manufacturing building and service facilities. A new truck making works is also being provided in Argentina under a program approved in 1958.

Big in Britain—Ford Motor Co.'s foreign subsidiaries and branches reached record levels in 1959, extending a trend of recent years. Sales by Ford in foreign markets hit $1483 million compared to $1389 million in 1958.

Ford Motor Co. Ltd. is the second biggest British auto maker. Ford U. S. holds 54.6 pct of the firm's common stock. Ford of England's share of total British car registrations in the British domestic market in 1959 was 26 pct, trucks 24 pct.

Last year Ford of England brought into full production a new assembly building, substantially completing a $216 million expansion program begun in 1955.

Latin Accents—Ford Motor Co. also owns 99 pct of the stock of Ford-Werke A.G., Germany, maker of Taunus cars and Ford-Koln trucks. Ford-Werke sold 157,522 cars and trucks in 1959, up 30 pct over 1958.

Ford Motor Co. do Brasil S.A., wholly-owned subsidiary in Brazil, has almost finished a major expansion of plant and facilities to produce trucks there. In 1959 the Brazilian company made 17,240 trucks, 60 pct more than in 1958.

Ford also got approval last year from Argentina to make light and medium trucks.

Everybody's Doing It — How about Studebaker-Packard and American Motors? S-P is making headway in rounding out its foreign operations and manufacturing and assembly agreements made recently in Israel, Chile and Australia (The IRON AGE, March 17, p. 78).

American Motors (Canada) Ltd., will build a new 250,000 sq ft plant this year in a suburb of Toronto for assembly of Rambler cars in Canada.

Compact Van Carries Big Load

CALL IT "JUNIOR"—GMC Truck & Coach Div. of General Motors offers a new half-ton delivery truck. It's called the GMC Junior Van. Only 14 ft long overall, it is shorter than any American-made compact car, yet it has the bulk load capacity of a one-ton stake truck.

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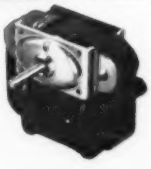
CUTS COSTS

DENISON 4-TON HYDRAULIC MULTIPRESS *is used by Barber-Colman to assemble low-cost precision AC motors.*



PREDICTED cost cuts have been *confirmed* by the installation of three Denison Multipresses at Barber-Colman Company in Rockford, Illinois.

Justified by MAPI (Machinery and Allied Products Institute) formula analysis, these presses operate in a line connected by belt conveyors. Semi-automatically, Multipresses perform bending, staking, aligning, compressing, riveting and stamping operations in the production and assembly of small precision electric motors.

In addition to more efficient handling of production functions, other Multipress *bonus benefits* include—product uniformity... reduced scrap loss... rapidly adjustable stroke length and pressure for faster, simpler set-up... longer die life to lower tooling costs and downtime.

Duplicate these savings and bonus benefits in your plant today! Your Denison Production Specialist can show you how with a **M**ultipress **A**nalysis **P**rogram that can **MAP** new savings for you now.

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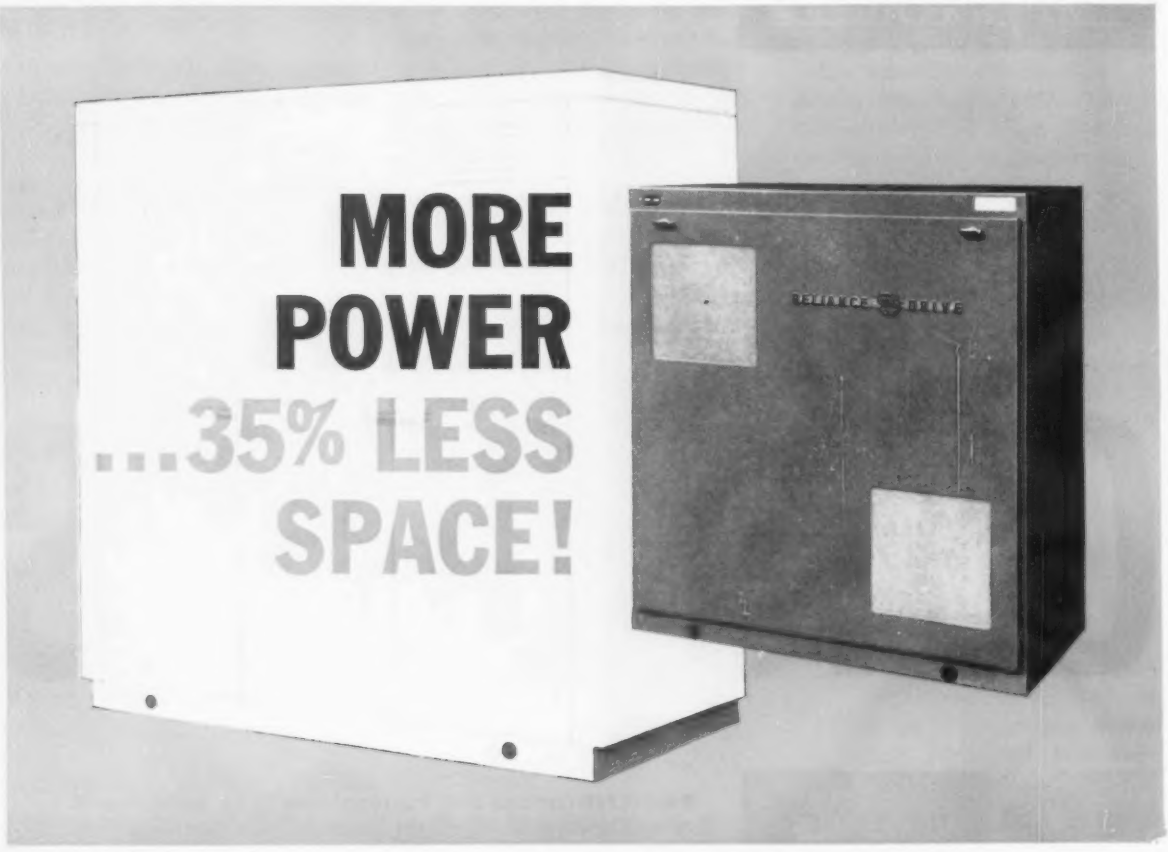

Both of these control units are rated at 50 horsepower! Actually, the new, small Super 'T' V★S cabinet packs more punch!

LIKE the Reliance Super 'T' Drive Motor, new V★S power units utilize Class B insulation, permitting a more compact unit. 100% overloads of one minute duration are accomplished without failure! Advanced design of ventilation keeps control and power units cooler . . . another reason why smaller size is possible. And service life is substantially extended.

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Super 'T' V★S Drives are available for immediate delivery. Check your Reliance salesman for delivery schedules on the full line, 1—350 hp., Bulletin Number D-2506, has been prepared to give you complete information. Write for it. D-1641

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Patent Royalties Under Study

Some Congressmen Want Them Paid to the Government

Under present government R & D contracts, contractors get patent rights on inventions stemming from their work.

Some congressmen believe the government should get the royalties as a return on its spending.—By G. H. Baker.

■ Industry is in danger of losing large sums in royalties from commercial patents developed through government research and development contracts. The issue now before Congress: Should the government, instead of private companies, profit from patents developed with federal tax money?

Some congressmen are proposing legislation under which the U. S. could get back some of its research expenditures. These now amount to $8 billion a year.

Target of bills introduced on the patent question is a provision in research contracts between industry and government agencies such as the Defense Department. This clause reserves to the contractor all rights of patents on inventions developed under government contracts.

Patent Monopolies?—A Senate patent committee believes the clause inhibits the prompt dissemination of technical data if the invention has commercial possibilities. Therefore, the committee reasons, the government's basic research program is adversely affected.

Backers of the proposed legislation also contend the present system is building up huge patent monopolies from some companies. They claim, too, that the present system is not in the public interest.

Industry Incentive? — There is another side to the question. Patent royalties are a big incentive to industry in contracting for government research projects. Changing the present patent system might hamper research needed in the space and missile race with Russia.

The Administration realizes that further study of the question is needed. So it has turned the problem over to a non-governmental patent foundation run by George Washington University.

Study Areas—The study will try to cast light on some factors:

The influence of the contractor patent-ownership policy in contributing to the concentration of economic power of large concerns to the detriment of a freely competitive industrial economy.

The motivating effect on scientists and other technical people actually engaged in the work of knowing that an invention would become government property rather than the property of their employer.

The possibility of reduced availability of research facilities of industry if there is a departure from present patent policies.

Relative effectiveness of the contractor patent-ownership policy as an incentive to concerns.

Closing the Ranks Is Essential

■ Stiff competition for markets throughout the 1960's means that labor and management will necessarily have to work closer together.

Also, labor unions are going to have to concern themselves more and more with the welfare of the industry they represent.

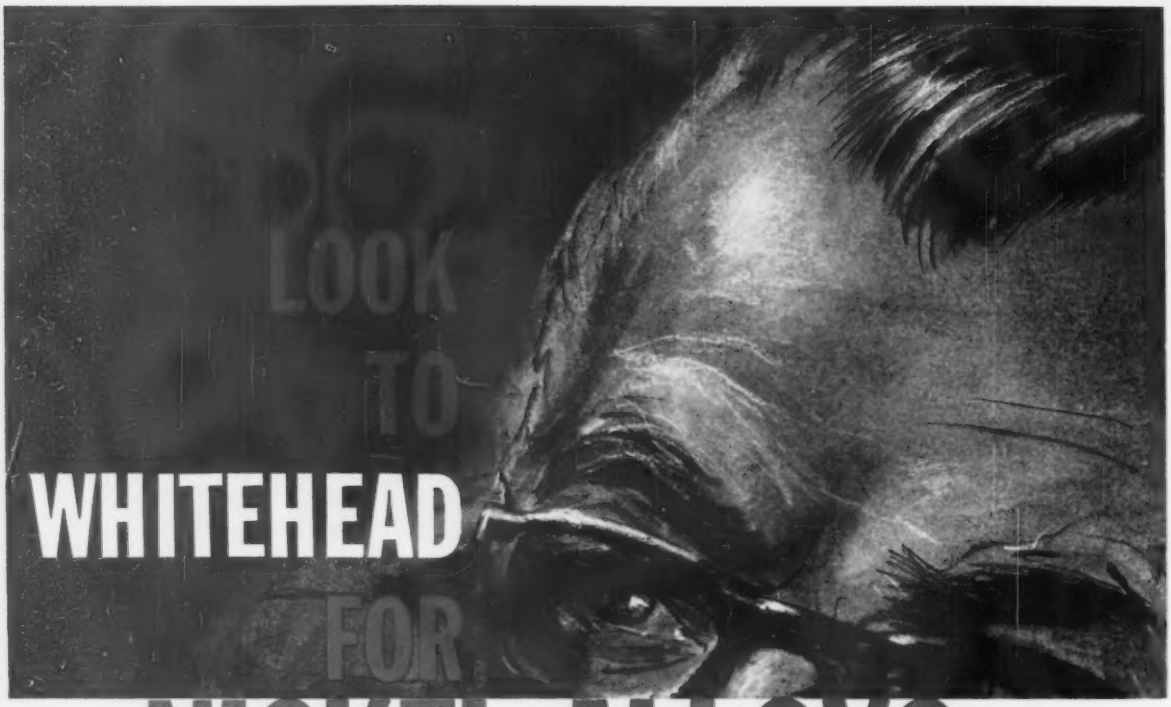
A Rough Road — These blunt warnings come from Ewan Clague, U. S. Commissioner of Labor Statistics. He foresees increasingly rough competition in the years immediately ahead. This extra competition will come not only from domestic producers, but also from the greatly-increased capacities of foreign producers.

U. S. manufacturers are confronted not only with the lower labor costs of their foreign competition, but also with highly efficient production machinery. Much of this production equipment is the last word in efficiency. Unit production costs, as a result, are much lower than anything that can be achieved here.

A Dangerous Attitude—A "go-to-hell" attitude on the part of either labor or management is now a great mistake, Clague warns. Because of mounting foreign competition, most U. S. industries simply can no longer afford either long strikes or wage rises that are not based on productivity. (Foreign producers thrive on these two weaknesses in the U. S. system.)

Think of the Future—Both employers and workers now will have to think carefully of the future prospects for their industry, Clague points out. He warns:

"Employers will have to be conscious of prices and markets, while unions will have to think in terms of preserving jobs."



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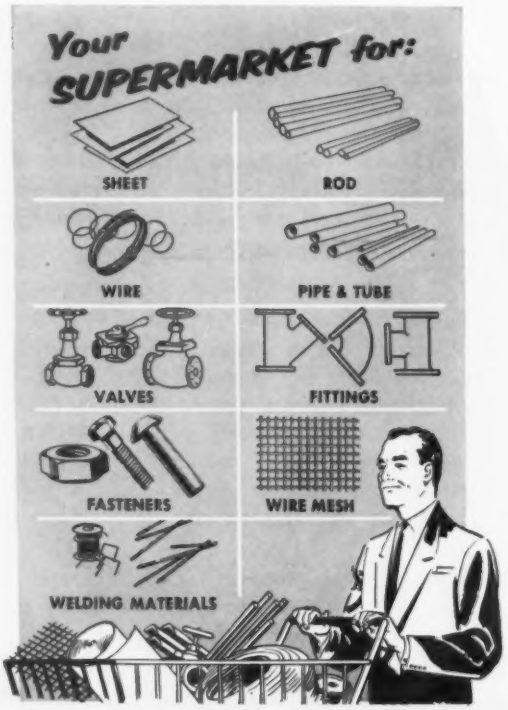

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What Makes Los Angeles Grow?

It Takes More Than Missiles and Aircraft

Progress at Los Angeles depends on a lot more than defense spending.

Other industries, including consumer goods and construction, help provide a solid economic base.—By R. R. Kay.

■ Don't be mislead by talk that Los Angeles is a one-industry town. It's not so.

Certainly the area is highly dependent upon the defense dollar. But aircraft - missilemaking is far from the whole show. Non-defense and consumer products manufacturing give a solid balance to the economy.

The potential in non-defense markets will grow at a faster rate than defense business. The reason is the explosive population growth. There's a constant buildup for more and more consumer goods and services.

More Buyers, More Cars—Every week there are 5000 more persons in the area—all customers. Every day there are 350 automobiles that weren't on the street the day before. It's a city on wheels.

Metropolitan Los Angeles, with 6.8 million persons, has 25 pct of the population of the 11 western states. Some 43 pct of the factory workers are there. The area consumes about 42 pct of the steel used in the Farwest.

Automobile assembly there is second only to Detroit. The car market can only get bigger. With public transportation not too good, Los Angeles residents must have a car to get around.

Home Building Helps — Home building is sure to continue as a strong base in Los Angeles' non-defense economy. Since World War II, 10 pct of all U. S. homes were built in metropolitan Los Angeles.

Home construction helps improve other large industries. Right now, Los Angeles ranks first in the U. S. in manufacture of gas heating equipment, gas cooking stoves and garbage disposal units. The city makes more furniture than Grand Rapids.

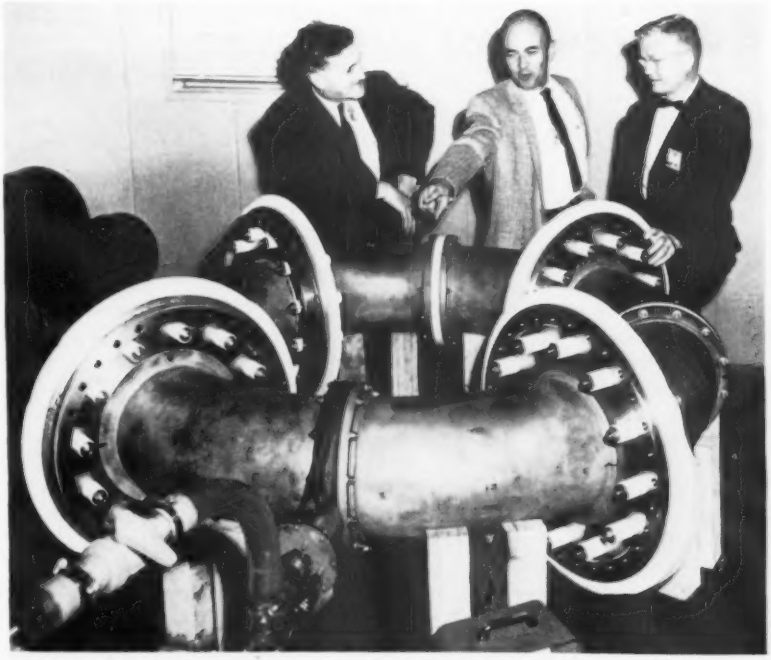
Pacific Ocean playgrounds make small pleasure-boat building a fast-growing industry. The same goes for skin diving gear.

So Does Oil Drilling—The outlook for production of oil well equipment is also good. Behind it is the development of new drilling areas, lower strata drilling and more off-shore operations.

The making of jetliners is a non-defense business. These planes will roll off the Douglas and Lockheed production lines for a long time. North American Aviation is also eyeing this market. So Los Angeles is certain to keep its No. 1 spot in the field.

One local manufacturer believes that by 1970, $2 billion a year will go into new Los Angeles plants and equipment.

This Will Be Home for the Perhapsatron



TORUS IS THE NAME: These hollow stainless steel doughnuts will house a nuclear fusion research instrument at the Univ. of Calif.'s Los Alamos Scientific Laboratory. Apparently recognizing some uncertainty, Los Alamos scientists call the instrument the Perhapsatron. Vessels were fabricated by U. S. Steel's Consolidated Western Steel Division.

This is a MARVEL High-Speed-Edge Hack Saw Blade Cutting a 4" x 4" Titanium Billet

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33 years ago, MARVEL introduced the first welded-edge hack saw blades . . . guaranteed them to be shatterproof . . . and a new concept of power hack sawing came into existence.

In combining, by welding, two materials—a narrow, high speed steel cutting edge, and a tough alloy steel body, MARVEL pioneered the modern hack saw blade.

When operators learned they could apply the heaviest feed pressures and highest speeds to the new MARVEL Blades with complete confidence that they would never shatter or "explode" to cause them personal injury, hack sawing began the approach to its present high level of efficiency. Even cutting "exotic" metals, such as titanium, where heavier feed pressures are a necessity, the MARVEL Blade does an outstanding job and is completely safe.

Today's MARVEL High-Speed-Edge Hack Saw Blades are greatly improved, even over the MARVEL Blades which were the best on the market a few years ago. Advanced metallurgy has produced better steels; new heat treating and manufacturing techniques have brought further improvements. The only thing unchanged is the Guarantee: THEY ARE SHATTERPROOF!

If you haven't used MARVEL High-Speed-Edge Hack Saw Blades recently, try them on your saws for a month and see the difference a truly superior blade can mean in higher speeds, greater accuracy, lower cost per cut, and guaranteed safety to operating personnel. Your nearby MARVEL Distributor carries a complete stock of MARVEL High-Speed-Edge Blades.

Write for Bulletin CT-175 which has complete details on MARVEL High-Speed-Edge Hack Saw Blades.

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MARVEL *Metal Cutting* SAWS
Better Machines-Better Blades

Will Builders Adopt Standards?

User Group Urges Builders to Standardize

Standardization of general purpose machine tools should be an aid to users—and to defense.

Builders listen to recommendations, but reaction is uncertain.—By R. H. Eshelman.

■ What can standardization do for general purpose machine tools?

Some opinions were offered last week when the General Purpose Machine Tool Standardization Group met in Detroit. This recently-formed group is made up of machine tool users. It proposes standards to simplify tooling for diversified industry.

Overdue? — Many machine tool experts believe that the attempt is long overdue. The U. S. metalworking industry and the machine tool industry itself have long been hampered by differences in tooling dimensions and mountings.

Meanwhile, Iron Curtain countries are getting set for cutthroat economic competition in machine tools. They've gone further than standardizing work tables and heights. They're chopping numbers of models to the bone.

Committee Goals—And they're using modular construction on general purpose machines, according to Arthur Colton, the American Society of Tool & Manufacturing Engineers' standards expert. A U. S. standardization program could put American tools on better footing to compete in foreign markets.

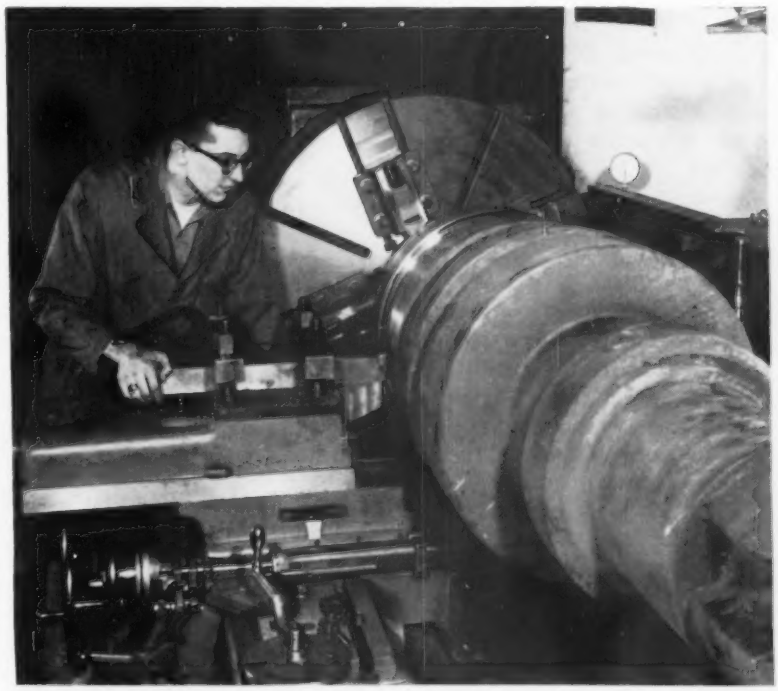
As outlined by chairman R. L. Witsche of International Harvester Corp., the industry committee's proposals cover four groups: Drilling machines, grinding machines, milling machines and turning machines.

Toolmakers Listened — Representative machine tool people from each of these fields sat in on the meeting. Their spokesmen agreed the program makes sense. No one was willing to comment at this point, however, how the program will be received by builders.

First real test will come when the program, and perhaps some specific recommendations, are presented to the National Machine Tool Builders' May meeting. It's expected that some non-member builders may also sit in on this discussion, because of its importance.

Defense Angle—At the Detroit meeting, John H. Williams, the Defense Department's blunt-talking but respected authority on tooling and production said, "Many of the things proposed will be of great benefit to the entire country." He cited defense product costs. "Also, the program will be vital to every metalworking manufacturer in the country. In a national emergency, he noted, it could be a lifesaver in mobilizing production.

Steel Mill Gets Tracer Lathe



MAKING COPIES: This large tracer lathe is used to roll turn steel mill rolls at Great Lakes Steel Co., Detroit. Part of the steel company's modernization program, it was built by LeBlond Machine Co.

INDUSTRIAL BRIEFS

Gas Turbine for USS—The American steel industry's first gas turbine for blast furnace blowing has been shipped from Westinghouse Electric Corp.'s Steam Div., Philadelphia. It will be put into operation at U. S. Steel's South Works at Chicago. The new gas turbine system eliminates the need for a boiler since the blast-furance gas is burned directly in the turbine.

Under Control — Robertshaw-Fulton Controls Co.'s new $4 million plant at New Stanton, Pa. is scheduled for completion by mid-1960. It will have a manufacturing capacity in excess of $110 million. When the new facility is in operation, the company's plants at Youngwood and Scottdale, Pa. will be sold.

Heat Treat for 'T' Steel—Construction has started on a new plate heat treating line at the Homestead District Works of U. S. Steel. It is the second to be designed and installed at this plant by the Drever Co., Bethayres, Pa. The line will treat plate from the 100 in. plate mill and will be used principally for the production of U. S. Steel's 'T' Steel.

May Trade Fair—The 1960 U. S. World Trade Fair will be held at the New York Coliseum, May 4-14. More than 3000 exhibitors from over 60 countries will be on hand. American industrialists and builders will have a chance to see the newest machines being made in other countries as well as machine tools and hardware.

New Aluminum Guide—A guide to the selection of aluminum alloys for virtually any product is contained in a new booklet. It is entitled "Olin Aluminum Mill Products." Copies can be obtained from the Metals Div., Olin Mathieson Chemical Corp., 400 Park Ave., New York 22, N. Y.

Tom Campbell Speaks — Steel Service Center Institute will hold its annual banquet at the Harvard Club, Boston, April 13. The principal speech will be by Tom Campbell, editor-in-chief of The IRON AGE. His topic: "The 1960-61 Business and Industrial Relations Outlook."

New Refractory Plants — North American Refractories Co. is building a new basic brick plant at Womelsdorf, Pa. Plans have also been completed for construction of a manufacturing unit to produce tar bonded brick used in lining oxygen converters. Both plants are expected to be in operation by the end of the year.

Screw Machine Seminar—Chase Brass & Copper Co. will conduct a multi-metal screw machine seminar March 24, at its New York-New Jersey warehouse located at Maspeth, Long Island. Buyers and users of aluminum, brass, copper and stainless steel will attend discussions of the characteristics of metals and their alloys in relation to machining.

New Company — Inductotherm Linemelt Corp., Delanco, N. J., has been formed with J. L. Hoff as president. It will manufacture core-type induction melting equipment based on designs developed by Mr. Hoff. Although a separate corporation, it is associated with Inductotherm Corp.

Change in Name — Houghton Laboratories has changed its name to Hysol Corp. The Olean, N. Y. firm, founded in 1949, offers commercial lines of epoxy adhesives and electrical insulation products.

Texas Cement—Universal Atlas Cement Div., U. S. Steel Corp., is expanding and modernizing its cement plant at Waco, Texas. It plans to install a second rotary kiln to provide a fully integrated two-kiln operation with an estimated capacity of over 2 million barrels of finished cement. A complete glass-bag filter system will also be installed.

Adding at Middletown—Armco Drainage & Metal Products, Inc., plans to build a $400,000 addition to the Middletown, O. steel building manufacturing plant. It consists of a new building with new forming and punching machinery for manufacture of newly engineered steel purlins. The purlins, a kind of roof joist, will be used in AD&MP's 1960 line of steel buildings.

More Canadian Steel—The Steel Co. of Canada Ltd., Hamilton, Ont., has let contracts for excavations, building and steelwork, in connection with a new $18.5 million openhearth furnace. It is part of a $60 million expansion program. The unit will have a capacity of 400 tons every 8 to 9 hours. It will raise Stelco's steelmaking capacity 500,000 tons to 3 million tons a year.

Switch in Selling—Pratt & Whitney Co., Inc., West Hartford, Conn., is planning to sell its line of cutting tools and conventional gages through local industrial distributors. Previously, all products were sold on a direct basis, through its own company representatives and branch offices.

Award for Miller—F. W. Miller, contracting engineer, Lehigh Structural Steel Co., Allentown, Pa., has received the Thomas M. Gregory Memorial Award. The award is presented annually by the American Hot Dip Galvanizers Assn. It was established in 1941 in honor of the Association's first president.

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Asarcon 773 can cut your replacement bearing costs many ways. Buying only the lengths you need means no short-end scrap. Your choice of diameters up to 9" reduces diameter loss—only 1/32" to 3/32" to machine off. Every Asarcon bar is unconditionally guaranteed to be free of blow holes, pits, or sand inclusions. No shrinks; no hard or soft spots. Better, more uniform properties. Order Asarcon 773 from stock in 260 sizes, solids, and tubes, from a national network of distributors. Write for address of nearest stock point, and complete data, to Continuous-Cast Department, American Smelting and Refining Company, Barber, N. J. or Whiting, Ind.

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AMERICAN SMELTING AND REFINING COMPANY

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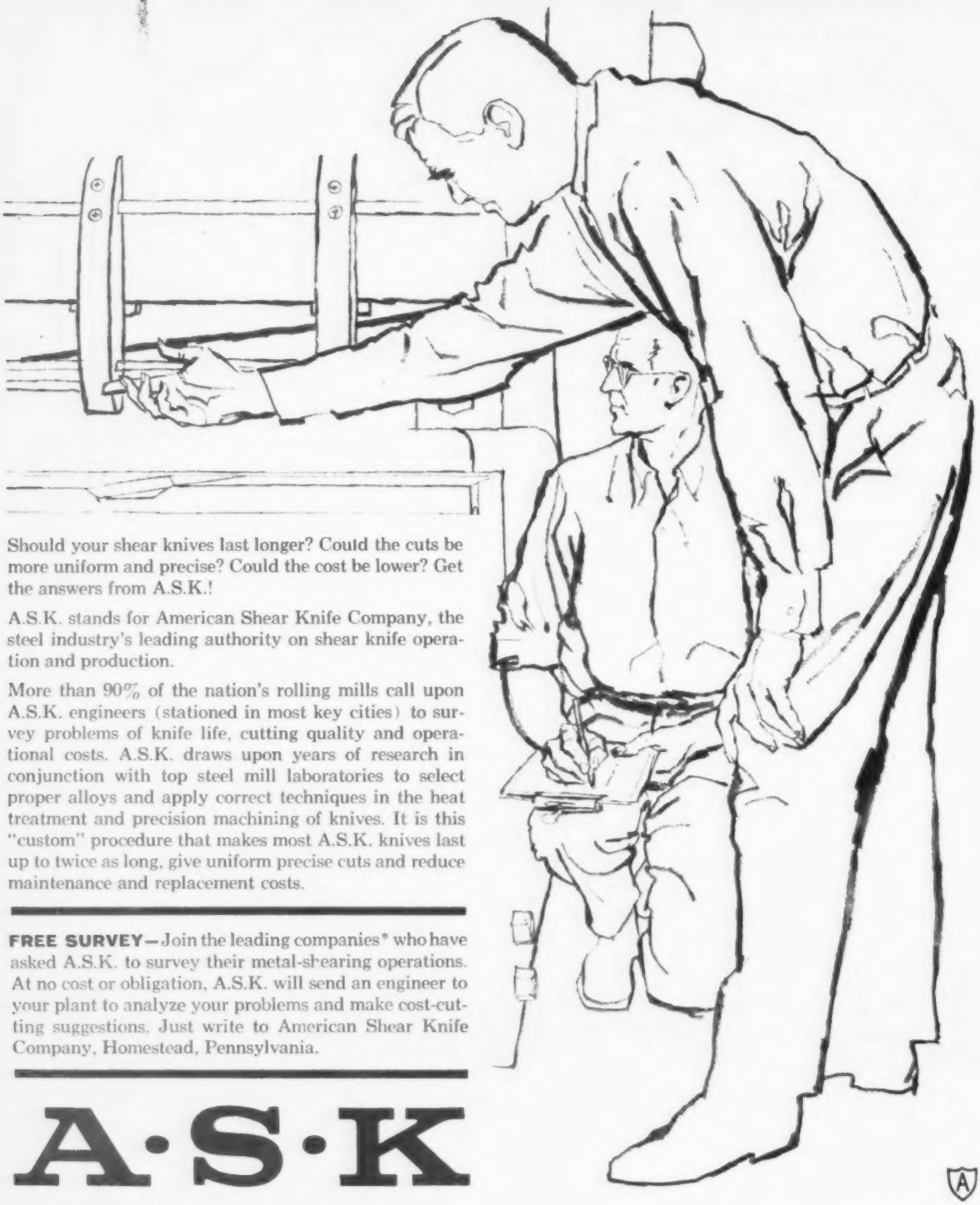
West Coast Distributor: Kingwell Bros., Ltd., 457 Minna Street, San Francisco, Calif. In Canada: Federated Metals Canada, Ltd., Toronto and Montreal. Distributors in many principal cities.

Can you get more wear from your shear knives?

A·S·K for the answer!



Should your shear knives last longer? Could the cuts be more uniform and precise? Could the cost be lower? Get the answers from A.S.K.!

A.S.K. stands for American Shear Knife Company, the steel industry's leading authority on shear knife operation and production.

More than 90% of the nation's rolling mills call upon A.S.K. engineers (stationed in most key cities) to survey problems of knife life, cutting quality and operational costs. A.S.K. draws upon years of research in conjunction with top steel mill laboratories to select proper alloys and apply correct techniques in the heat treatment and precision machining of knives. It is this "custom" procedure that makes most A.S.K. knives last up to twice as long, give uniform precise cuts and reduce maintenance and replacement costs.

FREE SURVEY—Join the leading companies* who have asked A.S.K. to survey their metal-shearing operations. At no cost or obligation, A.S.K. will send an engineer to your plant to analyze your problems and make cost-cutting suggestions. Just write to American Shear Knife Company, Homestead, Pennsylvania.

A·S·K

AMERICAN SHEAR KNIFE

**names supplied on request*

Dr. H. H. Pry, named manager, alloy studies section, General Electric Research Laboratory, Schenectady, N. Y.

Reliance Steel Castings Co.—**E. A. Blasdell,** elected president; **D. W. Ebbert,** elected vice president, secretary and member of the board of directors.

Armco Drainage & Metal Products, Inc.—**K. C. Thomas,** appointed vice president, manufacturing and engineering; **G. R. Betts,** named division manager, Great Lakes Div., South Bend, Ind., headquarters.

Borg - Warner Corp., Warner Automotive Div.—**R. H. Wheeler,** appointed vice president, manufacturing.

Cal-Metal Pipe Corp. of Louisiana—**Ken Bayless,** named vice president, sales.

Lewis Bolt & Nut Co.—**D. W. Knudtson,** becomes vice president.

Greenlee Foundries, Inc.—**H. F. Lewis,** elected vice president.

Arcair Co.—**Richard Henderson,** appointed chief engineer, Lancaster, O.

Dowell Div., Dow Chemical—**A. F. Beale, Jr.,** appointed director, research.

Acme Steel Co.—**E. C. Kent,** appointed director, insurance.

Titan Metal Mfg Co., Div. of Cerro de Pasco Corp.—**G. J. Miller,** appointed plant superintendent, Newark, Calif.

The Carpenter Steel Co., Alloy Tube Div.—**Robert Nagel, R. L. Romoser** and **J. O. Digert,** appointed Chicago territorial managers.

Denison Engineering Div., American Brake Shoe Co.—**J. W. Lindsay,** appointed regional product sales manager, north central region; **J. D. Schaffner,** appointed field engineer, St. Louis area.

American Steel & Wire Div., U. S. Steel Corp.—**M. B. Henderson,** appointed customer service metallurgist, Metallurgical Dept., Detroit.

E. B. Thompson, elected a vice president, Parker Rust Proof Co.

Allis-Chalmers Mfg. Co., Industrial Equipment Div.—**M. M. York,** appointed manager, marketing.

U. S. Steel Corp., Universal Atlas Cement Div. — **W. R. Doolittle, Jr.,** appointed manager, sales, central sales region, Chicago headquarters; **Auwell Fogarty,** appointed sales manager, metropolitan Chicago sales district; **J. E. Taylor,** appointed asst. to vice president, General Sales Div., New York headquarters; **R. D. Holloway,** appointed sales manager, Illinois sales

(Continued on P. 138)

L. S. Brock, named executive vice president, U. S. Steel Products Div., U. S. Steel Corp.

G. C. Gates, appointed purchasing manager, Pratt & Whitney Co., Inc., West Hartford, Conn.

W. G. Graeber, promoted to personnel director, Pratt & Whitney Co., Inc., West Hartford, Conn.

It cleans • It roll marks and it prints • all within your production line.

The unit illustrated removes drawing compounds and grease from the surface of tubing so a good clean mark can be printed; while 180° opposite the printed mark a controlled depth indented mark is applied. For bars and tubes from ¼" to 6" dia. adjustable for speeds to 1000 ft. per minute.

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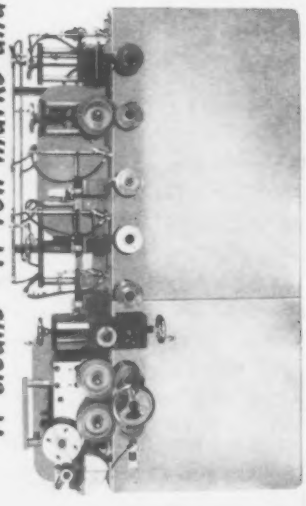

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SURFACE
CONDITIONER
MACHINE

(Continued from P. 137)

district, and **E. J. Lonergan,** appointed asst. sales manager; **C. E. Newton,** appointed sales manager, Indiana-Michigan sales district, and **E. J. Dwyer,** appointed asst. sales manager.

J. N. Heald II, appointed manager, domestic distributor sales, The Heald Machine Co., Worcester, Mass.

Dreis & Krump Mfg Co. — **R. Johnson,** appointed vice president and general sales manager.

Conco Engineering Works, Inc., Material Handling Div.—**Ben Fles,** appointed sales manager.

Aluminum Co. of America — **J. A. Burt,** appointed manager, railroad sales.

E. J. Lavino & Co.—**A. H. Bergey,** appointed asst. treasurer.

Dr. L. R. Scharfstein, appointed supervisor, corrosion research, The Carpenter Steel Co., Reading, Pa.

T. J. Josalle, appointed general sales manager, Marman Div., Aeroquip Corp., Los Angeles.

American-Standard, Industrial Div.—**S. D. Johnson, Jr.,** appointed manager, quality control.

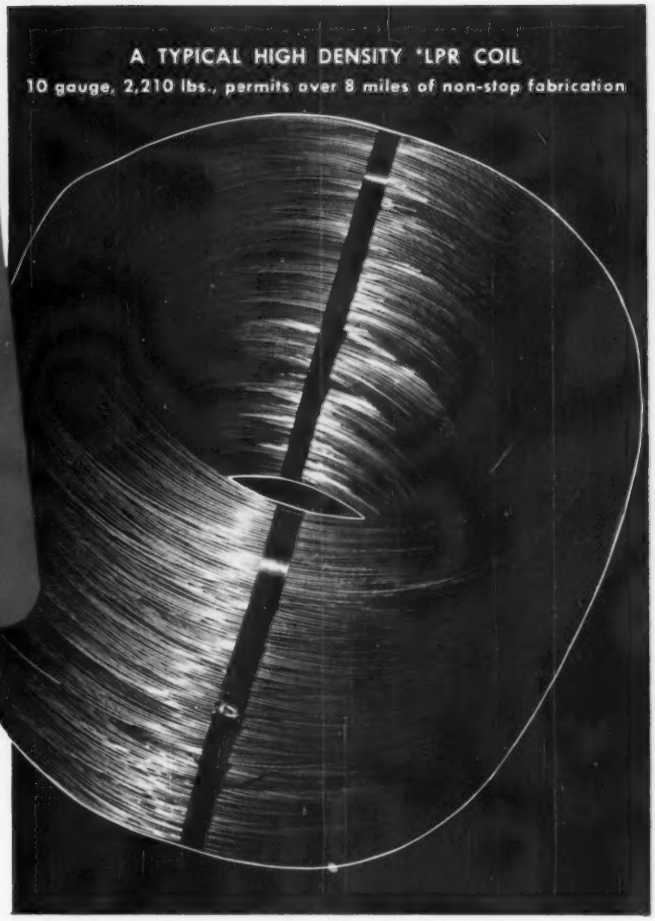
Aluminum Co. of America, Commercial Research Div.—**G. F. Reynolds,** named manager, statistical section.

Hyster Co., Industrial Truck Div. —**W. A. St. Clair,** appointed sales manager.

Stanley Abkowitz, appointed manager, refractory metals product development, The Metals Div., Kelsey-Hayes Co., New Hartford, N. Y.

Armco Steel Corp.—**D. C. Osborne,** named asst. general superintendent, maintenance and services, Middletown Works; **F. E. Gerber,** named superintendent, cold reduction finishing; **F. M. Morrow,** appointed asst. general superintendent,

(Continued on P. 143)



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on your Brite Wire coils means greater efficiency in your fabricating operations —at no added cost

Typical *LPR Savings as reported by Users (See Note)

- **Downtime frequency due to coil changes and setup adjustments cut as much as 95%.**
- **Cumulative coil-end scrap trimmed to the bone.**
- **Man-hour costs slashed (20% and more is common).**
- **Material handling time and expense substantially reduced. Unloading time alone cut from 16% to 50%.**
- **High density, self-supporting coils release 15% to 20% of storage space for more productive uses, improve inventory management.**
- **Machine productivity increased . . . for example, 1 man now operates 4 machines against 3, previously.**
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NOTE—Savings and improvements cited were experienced following switch from traditional mill weight bundles (150 pounds to 400 pounds).

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We'll gladly share our experience with you if you're a Brite Wire fabricator. We also invite you to visit our Portsmouth Mill to see for yourself how *LPR's perform. For an appointment or for further information on any DSC products, please call your nearest DSC Customer "Rep" or write Detroit Steel Corporation Box 4308, Detroit 9, Michigan.

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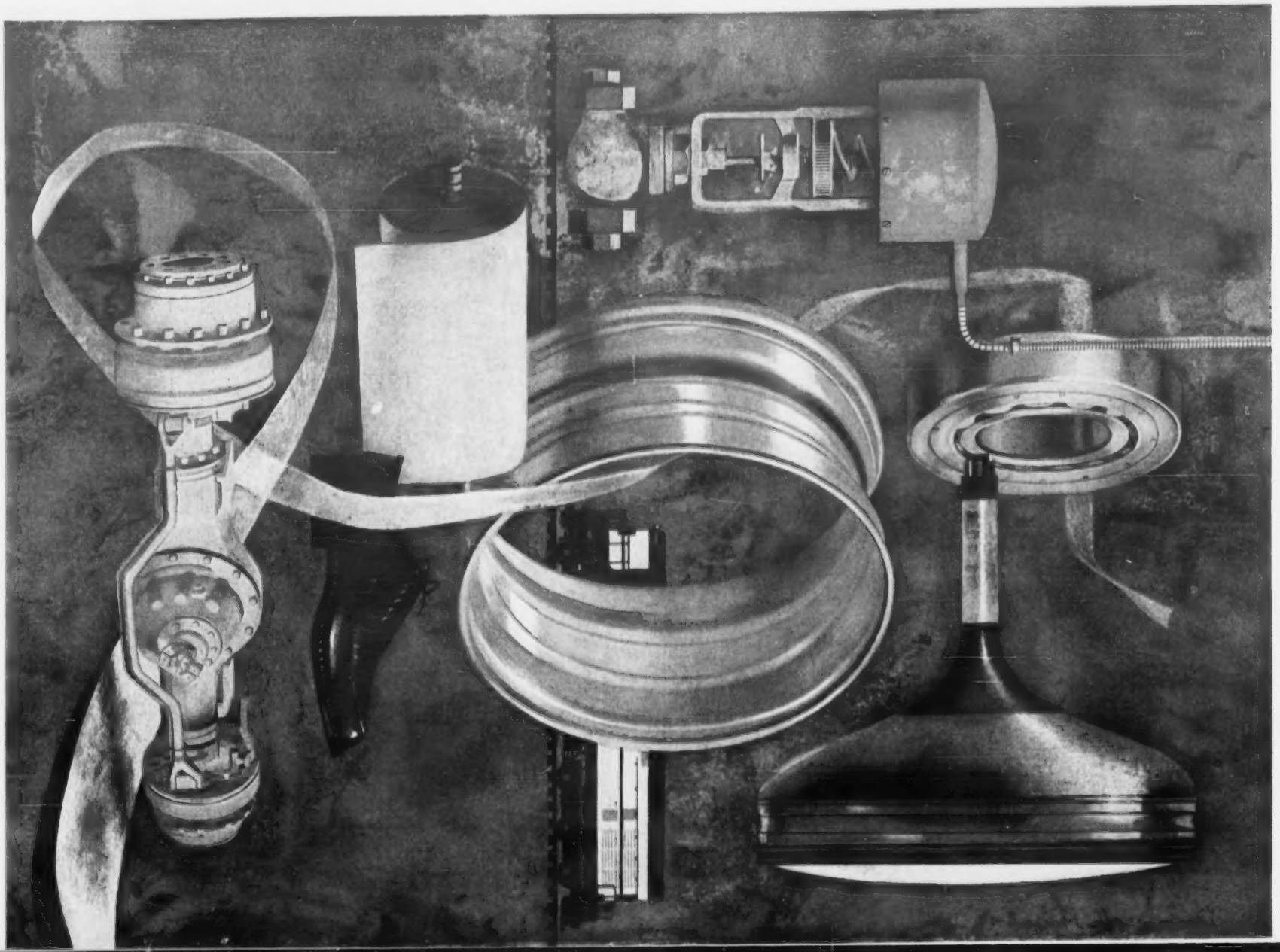

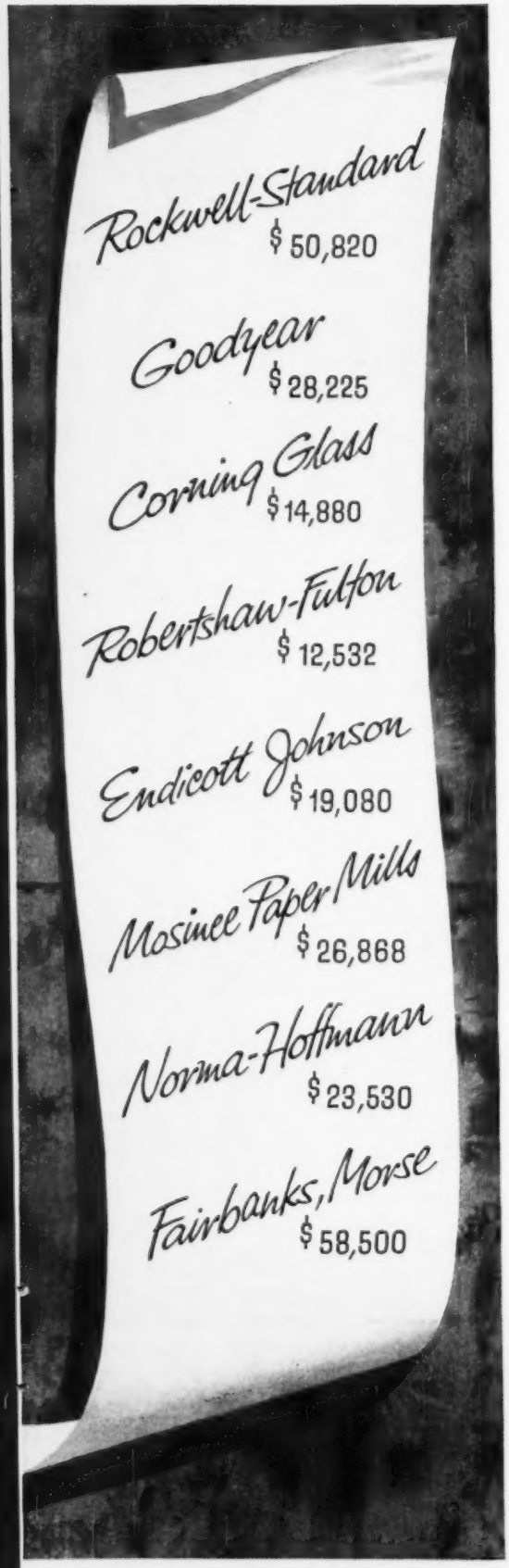

Can savings like these be made in your plant?

A Mobil Program of Correct Lubrication helped these companies save $234,435 in maintenance costs. Find out how it can help you improve your profits.

The dollar-savings shown at left are just a small part of Mobil's proof-of-performance story. We show them here to emphasize that Mobil does not merely *promise* results—a Mobil Program of Correct Lubrication *delivers* in terms of improved production, increased profits and lower maintenance costs. In fact, very often dollar-savings far exceed the purchase cost of lubricants. That's what makes the Mobil program so attractive to management.

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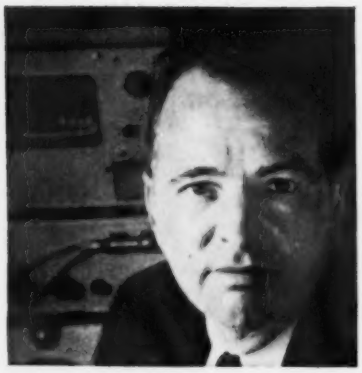

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5. Quality Control to meet top standards or match your special needs.

6. Complete Line including all commercial forms, alloys, gages, tempers.

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8. Foremost Library of films and books to help you do more with aluminum.

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(Continued from P. 138)

rolling and processing; **Eli Komnenovich,** becomes superintendent, coating, stainless, and finishing; **D. S. Mann,** promoted to superintendent, East Processing Dept.

George Rouvalis, appointed manager, J. M. Hopwood Laboratory, Hagan Chemicals & Controls, Inc.

Kaiser Aluminum & Chemical Sales, Inc., Electrical Conductor Div.—**J. W. Loveland,** appointed asst. general sales manager; **W. W. Hicks,** named Electrical Conductor sales manager, northeastern region.

L. B. Foster Co.—**J. R. McCutcheon, Jr.,** named product manager, valve and fitting sales; **F. M. Salina,** named product manager, rail and track sales, and **R. M. Crawford,** named product manager, pipe sales, the Pittsburgh region.

H. S. Caufield, appointed superintendent, inspection and steel conditioning, Gadsden plant, Republic Steel Corp.

Hooker Chemical Corp., Durez Plastics Div.—**R. M. Stroman,** promoted to manager, Buffalo sales district, and **E. F. Borro, Jr.,** to asst. product manager, molding compounds, Sales Dept.

The Dow Chemical Co.—**G. J. Williams,** named asst. general sales manager; **A. A. Butterworth,** promoted to sales manager, Plastics Dept.

Buhr Machine Tool Co.—**R. L. Deneau,** appointed asst. to the general sales manager, Ann Arbor, Mich.

General Motors Corp., Detroit Diesel Engine Div.—**G. R. Holly,** named manager, sales engineering.

Borg-Warner Corp., Pesco Products Div.—**J. F. Murray,** appointed director, engineering; **T. D. Carpenter,** becomes manager, future product planning, and **L. J. Schafer,** appointed project manager, Engineering Dept.

(Continued on P. 144)

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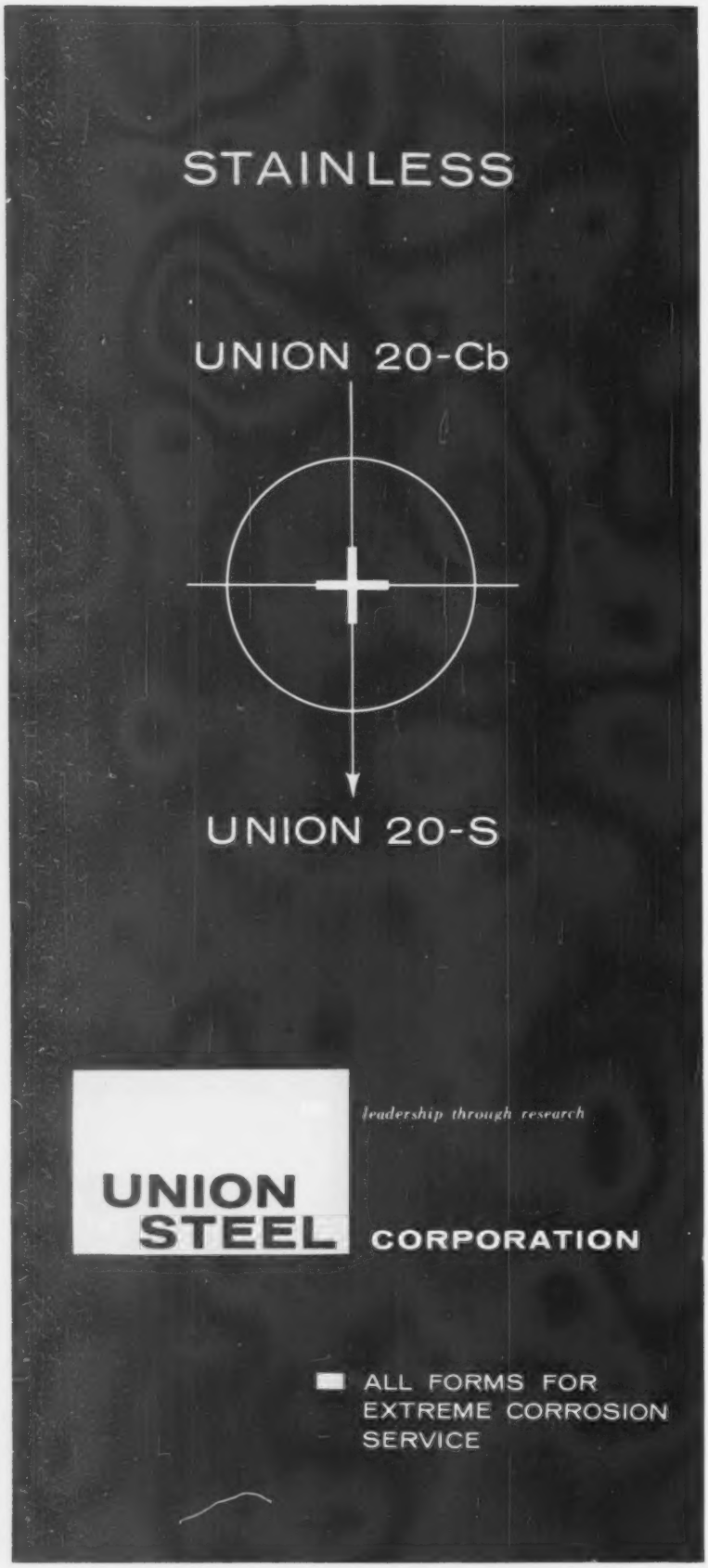

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Bendix Aviation Corp. — **E. J. Strong,** appointed Southwest regional manager, industrial controls section.

Martin Steel Corp.—**R. P. Norris,** promoted to comptroller.

Sparton Corp., Sparton Electronics Div.—**H. B. Scott,** appointed purchasing manager.

Federal Pacific Electric Co.—**H. D. Langley,** appointed marketing manager, motor control.

Van Norman Industries, Inc., Electronics Div.—**C. B. Eisenhauer,** named general manager.

U. S. Industries, Inc. — **J. K. Meyerer,** elected controller.

Oliver Machinery Co., Metal Working Machinery Div. — **R. C. Wing,** appointed sales manager.

Firth Sterling Inc.—**K. H. Carlson,** appointed manager, technical services.

General Motors Corp., Defense Systems Div.—**Dr. H. A. Wilcox,** appointed director, research and engineering.

Koppers Co., Inc., Engineering and Construction Div.—**R. E. Zimmermann,** appointed sales engineer, Freyn Dept.

Clark Equipment Co., Industrial Truck Div.—**W. A. Crofoot,** appointed manager, quality control.

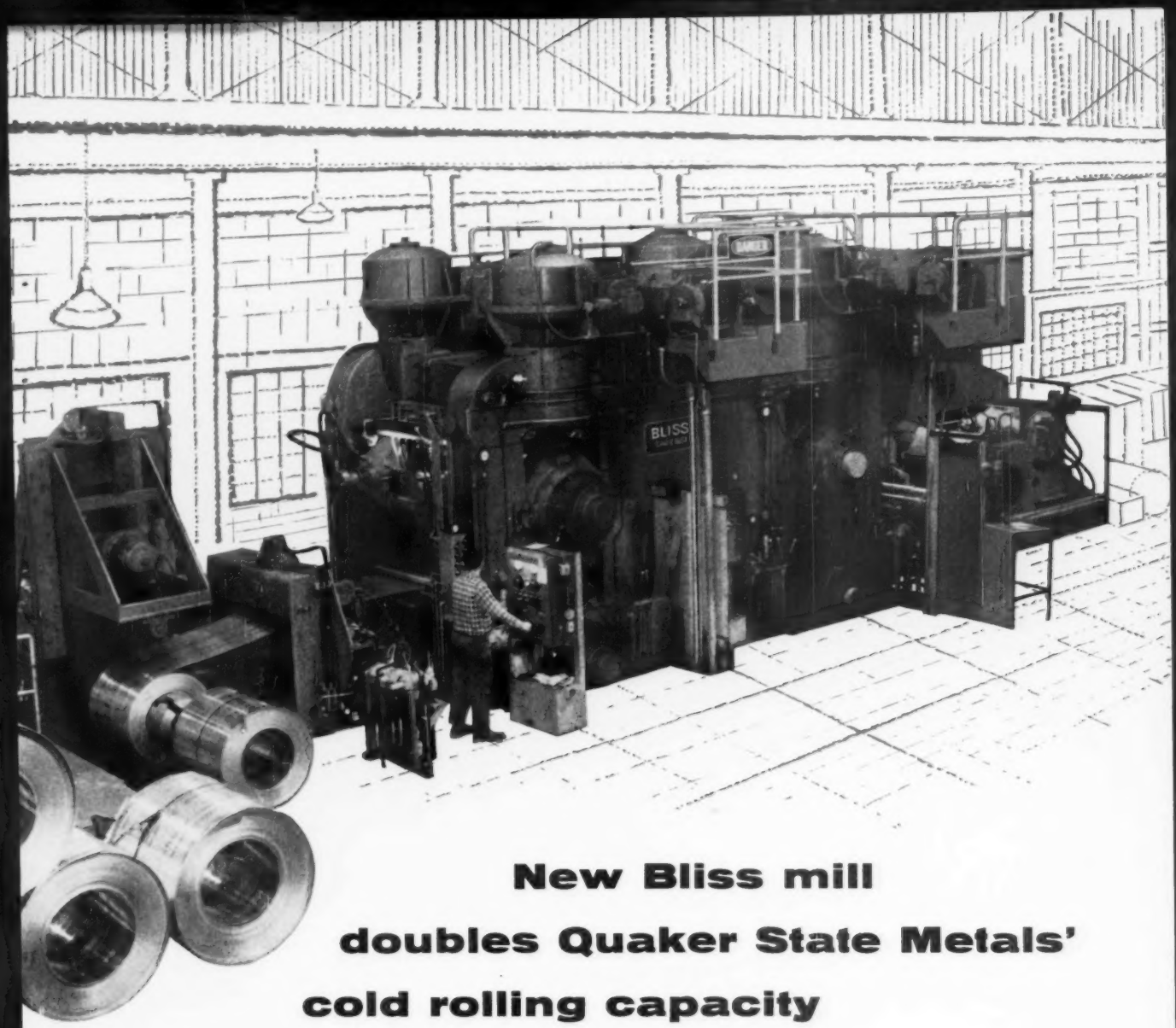
Chrysler Corp., Marine and Industrial Engine Div. — **W. F. Humphrey,** appointed director, sales.

Bliss & Laughlin Inc.—**J. E. Romer,** appointed manager, Western sales; **R. W. Ramage,** appointed manager, Eastern sales; **C. F. Steinbach,** appointed Newark district sales manager.

OBITUARIES

J. R. Paisley, vice president and general manager, Wean Equipment Corp., Cleveland.

A. E. Forberg, 73, sales engineer, National Broach & Machine Co., Detroit.



New Bliss mill doubles Quaker State Metals' cold rolling capacity

With a rolling capacity now approaching 10 million pounds a month, Quaker State Metals Company of Lancaster, Pa., division of Howe Sound Co., ranks as one of the largest independent rollers of aluminum in the United States.

A new Bliss tandem mill is a key unit in Quaker State's recently completed expansion program. In production a week after its erection was completed, the mill has more than doubled the plant's cold rolling capacity.

It reduces strip from .250 inch to .062 inch in a single pass. Delivery speed is 1500 fpm. Coil handling is completely mechanized, utilizing a coil opener equipped with a peeler knife and an automatic guide control.

Whether your own plans call for the addition or modernization of a single unit or a complete rolling plant, you'll find that the Bliss Rolling Mill Division can help you with the problems you may encounter. For examples of Bliss installations for rolling both ferrous and non-ferrous materials, write for our 84-page Bulletin 40-B.

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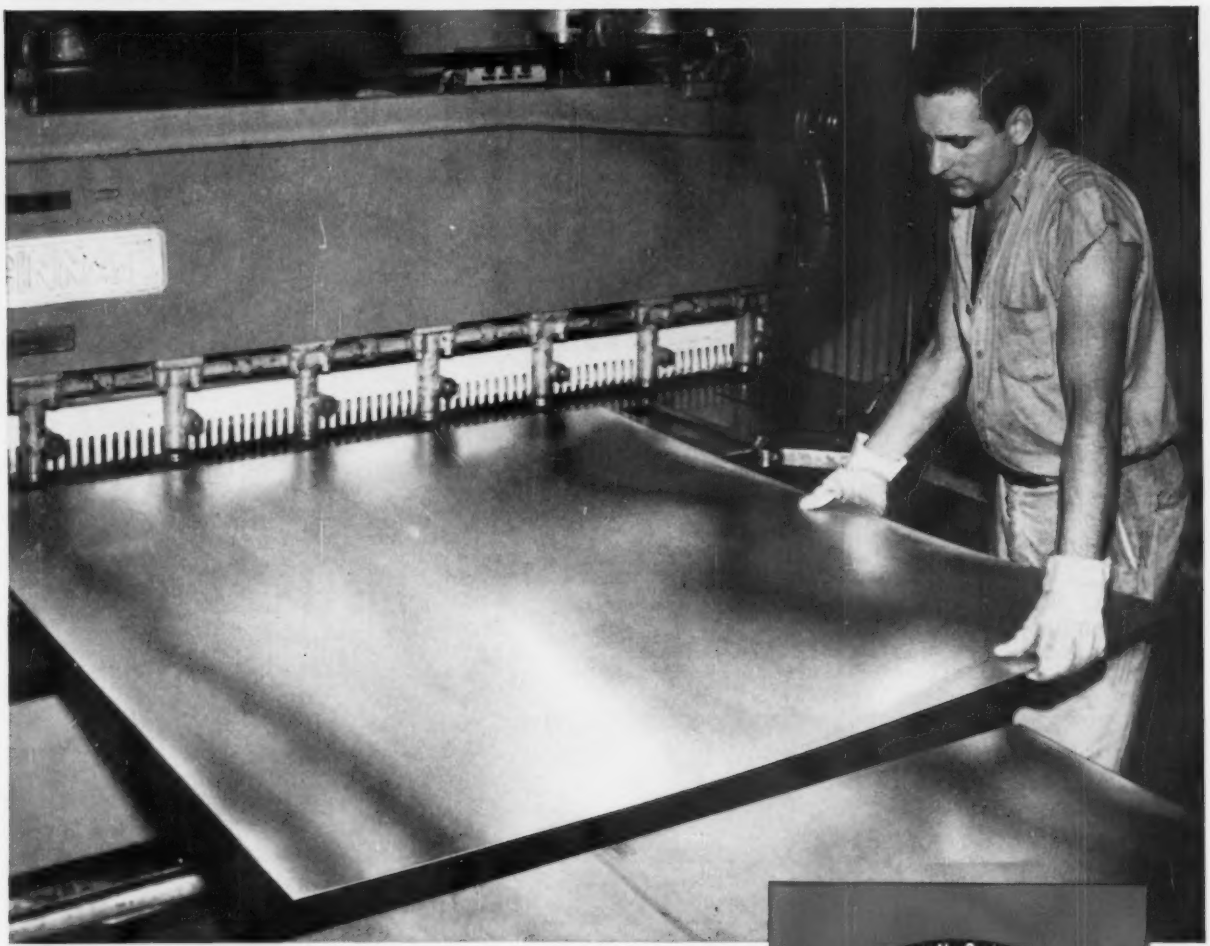

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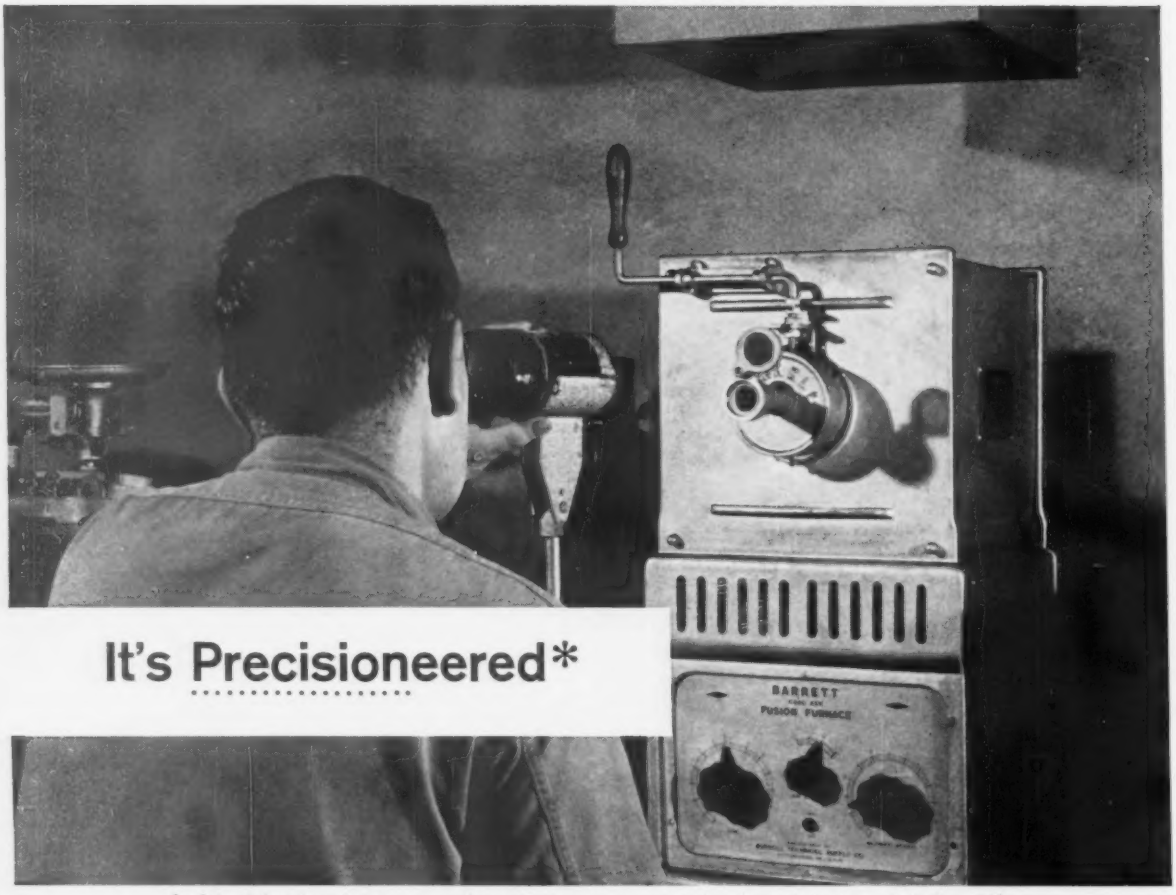

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Nail Automation Challenges Foreign Competition

Spurred by sharpening foreign competition, basic steel products, such as nails, are fighting to hold domestic markets.

One of the most significant moves is the overhauling of outmoded production methods.

By R. H. Eshelman,
Machinery Editor

▪ U. S. nail manufacturers have their eyes focused on a way to automate handling of "impossible" bulk products such as nails and other fasteners. Machine designers at Dake Corp., Grand Haven, Mich., have come up with an answer the industry has been seeking.

Simply stated, this gives nail makers the weapon they've badly needed to combat competition based on low foreign wage rates. Tide of imports of nails and other standard fasteners has been swelling steadily in recent years. It has now reached 40 pct or more of U. S. consumption.

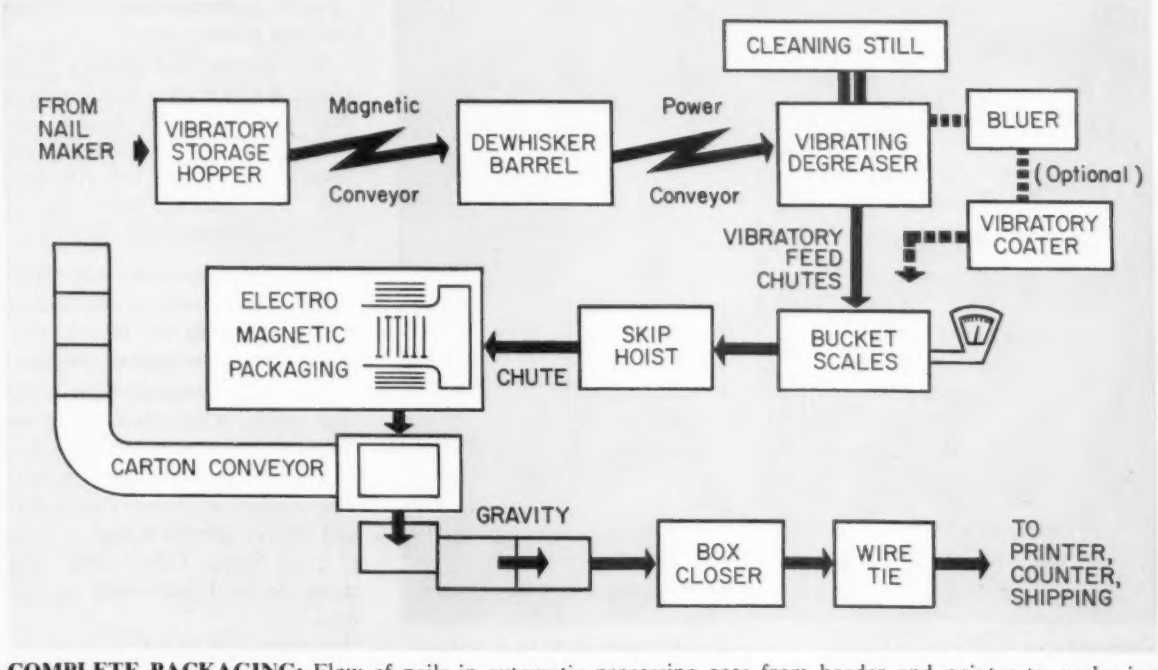
American manufacturers have no choice. They must take drastic steps to save the industry. Fortunately, several technical break - throughs have appeared to help solve the problem.

One of these is the magnetic conveyor. It will transfer nails and other small steel items almost vertically. A second development is magnetic packaging. A third is compact, vibratory degreasing.

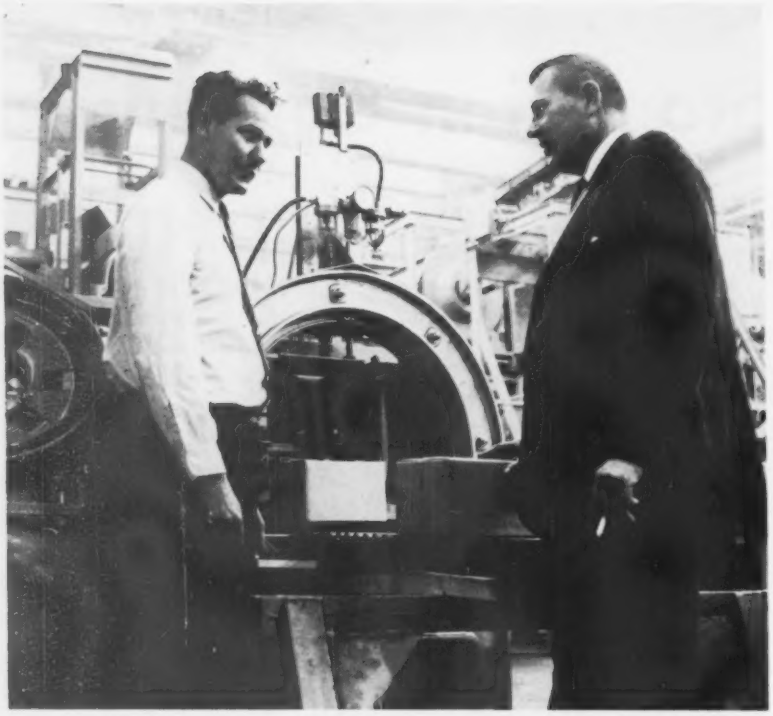
A Problem of Bulk—Although not the originator of these processes, C. N. Jacobson of Dake sparked the concept and foresaw their potential for this application. And under his direction equipment was designed and integrated to make them pay off in production.

As he analyzed it, the problem was one of dynamics. "In the bulk, nails lock and jam together in an unmanageable mass," he explains. "Once you break them apart and

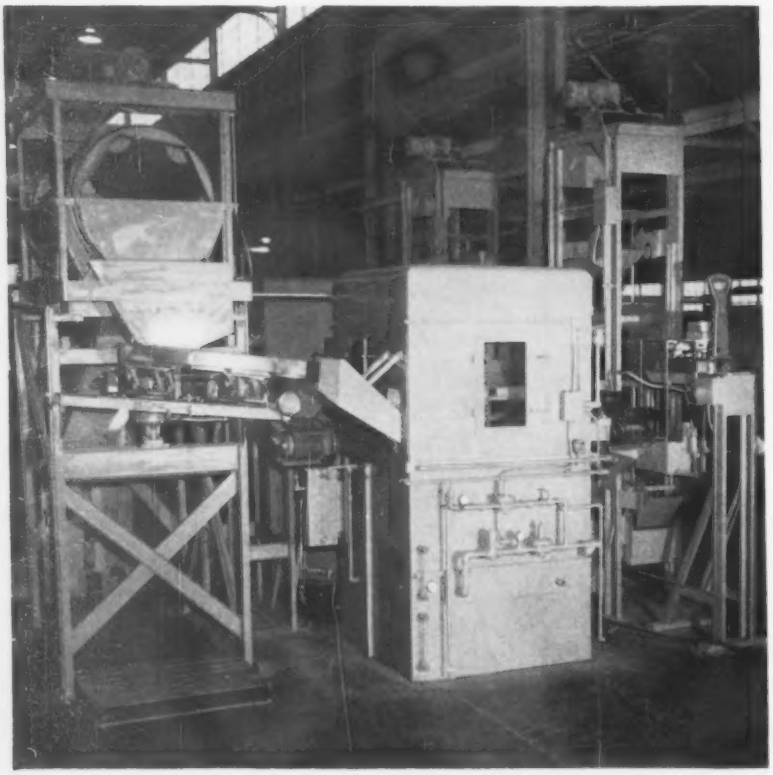
Handling Units Solve Nail Processing Bottlenecks



COMPLETE PACKAGING: Flow of nails in automatic processing goes from header and pointer to packaging.



A DESIGNED SETUP: Gene O'Dell, left, and C. N. Jacobson of Dake Corp. talk over automatic nail processing line that they designed.



AUTOMATED FLOW: Magnetic conveyor (left) feeds nails to dewhiskering barrel. Then they enter degreasers, which feed to automatic weighing.

keep them moving, you're in business. Then you can handle them automatically."

Simple Solution—This solution, as often with such technical advances, appears ridiculously simple—and effective. But it takes creative engineering and hard development work. Smooth functioning of the automatic nail processing line shows this.

It's comprised largely of modified commercial units molded into an easy flowing line. From the usual cold headers and pointers, nails go into a storage hopper.

This hopper feeds out on a magnetic belt, which carries the string of nails into a dewhiskering barrel. Then the load passes into a vibratory degreaser, perhaps into a similar blueing or coating unit as well, and into vibratory chutes which feed hopper scales.

Spread Out Load—A skip hoist then carries the load of nails to the top of a vibrating feed chute. This spreads out the load.

As the nails drop into the packaging chute a magnetic charge aligns them horizontally along one axis. If they came down in a dense mass, this would not be possible. The load of nails is demagnetized and drops into the waiting carton.

Box cartons feed down a gravity chute. A trip relay actuates a piston that redirects each carton after loading on another conveyor that feeds the carton to the wire tying unit. The package then goes to printing, counting and shipping.

Packaging Improved—Mr. Jacobson observes that a series of marketing trends in the nail trade is what made automation practical.

Packaging economies also came into play. Conventional manual method is to rake nails from a feed trough into a carton to an approximate weight. A checker then weighs and adds or substracts nails to bring to exact figure. Others then close, stamp or label and count the cartons.

But when the trade went to the smaller, more convenient weight,

packaging costs virtually doubled.

A Neater Package — Magnetic packing, automatic packaging and tying gives a denser, neater package. It saves up to 20¢ per box.

But to take full advantage of the new technique, Dake has worked with carton manufacturers to develop a smaller, better box. It's cheaper, too, and better suited to automatic handling.

Its top is the familiar milk-carton fold. Carpenters can simply refold and store a partially used box, without danger of spillage.

Big Payoff — Because of traditional manual methods, the overall savings in lower unit carton costs with automatic processing is truly great. Some economic studies show you can save up to 50 pct.

While maximum savings can be realized with the new package, lines are being designed to process the typical two-piece carton, or even wood boxes. In addition to greater utility with the new carton, there are other marketing advantages to automated nail processing.

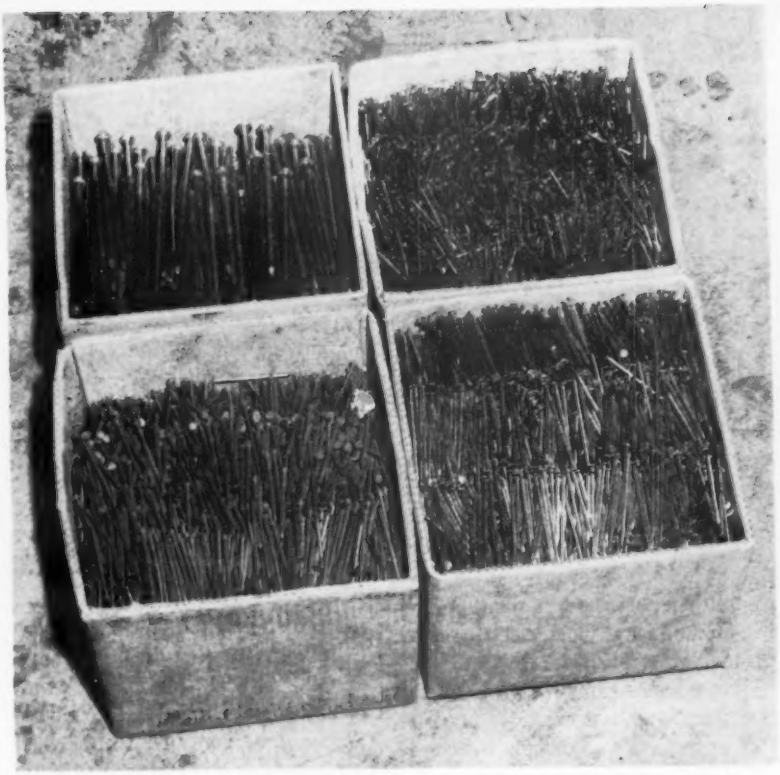
For instance, degreasing in the spiral-track vibratory unit gives a cleaner, more sanitary nail. Its effectiveness results from both hot-liquid and vapor cleaning.

Other Advantages — Solution commonly used is trichlorethylene. However, a special fluid is being perfected by Dow Chemical for this operation. Dake engineers demonstrate by the "white sleeve" test that the process gives a more sanitary, chemically clean product than manual handling.

Some lines are also being designed and built with similar bluing or rosin coating equipment. They have handling provisions for bypassing these steps, if desired.

Close Control—From the bulk hopper through the final tie, electric interlocks and special design features maintain close control of nail flow. Just ahead of the dewhiskering barrel, a pre-weigher meters the charge of parts.

This prevents overloading of the barrel. Also it shuts down the magnetic belt to avert build-up and spillage there.



TIGHT FIT: Various sizes of nails are aligned and packed in 50-lb cartons. Timed demag unit reverses polarity to drop nails into boxes.

The angle of tilt, adjusted by a push-button air-valve, determines the time of dewhiskering. It permits control for various sizes of nails.

Action of this operation is one of tumbling, to remove whiskers and give a polishing effect. A probe on the degreaser prevents jams, cleans out any build-up from overfeeding.

Accurate Weight—The two vibratory chutes to the scales feed at a fast rate until about 48 lb is reached. Then a mercury switch cuts feed to a trickle. A shutoff switch stops feed at 50 lb, plus 2 oz, minus zero.

Interlocks on the skip hoist prevent its dumping unless a box is in position and the carry-off conveyor is functioning. If the empty carton conveyor runs out of boxes, the line shuts off automatically.

Many Sizes—A single line will handle a range of nail sizes. Only a few changes are needed for a new size run. The dewhiskering barrel is dropped to completely empty it.

To handle a high hourly volume, the line is split after dewhiskering. Dual processing through degreasing, weighing and packaging gives higher output.

Trips and relays prevent boxes from the first packer from interfering with those from the second on the discharge conveyor. Two magnetic packers will take eight 50-lb units per minute.

Early lines already are in production in several plants around the country. They've proved remarkably trouble-free and demonstrate the soundness of the automatic handling.

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Load Meters Provide Control For Manual Machining

Simple meters allow control of all major factors affecting a hand-fed saw and a router.

Meter readings, read as a percentage of rated motor capacity, measure the amperes drawn by each machine's motor.

▪ Using hand-fed machines, it's hard to mass-produce parts to close tolerances. It's even harder to establish a set of repeatable working methods that include fixed rates of metal removal.

Exact instructions for a hand-fed operation aren't feasible — unless the operator can control, by easy measurement, all major factors that affect the work.

Installation of simple load meters and convertors, on two machines which fall into this category, solves the problem at the Defense Electronics Div., General Electric Co., Pittsfield, Mass.

These machines are a table saw for cutting, and a router for contouring aluminum alloys. Both are electrically driven. This suits the installation of load meters as logical measuring devices.

The meters establish control of working criteria. They also provide a method of maintaining optimum working conditions.

Install on Saw—To adapt a 12-in. table saw for use in cutting aluminum sheet, plate and structural members, one of the factors that must be controlled is the feed rate. This is a function of the pressure an operator exerts on the work.

Surface finish, blade life, dimensional accuracy and, of course, the rate of cutting determine capability of the machine. All these factors depend on the feed rate.

If a group of workers are going to produce the same results; then an easy means of controlling the feed rate is needed. Economical load meters and convertor units fill this need.

Each load meter measures the amperes drawn by the motor to which it's converted. The calibrated meters indicate ampere readings as a percentage of rated motor capacity.

Control Cutting Rate—Use of a percent load indicator allows all operators to produce identical results. The meter gives them a tangible means of controlling their cuts.

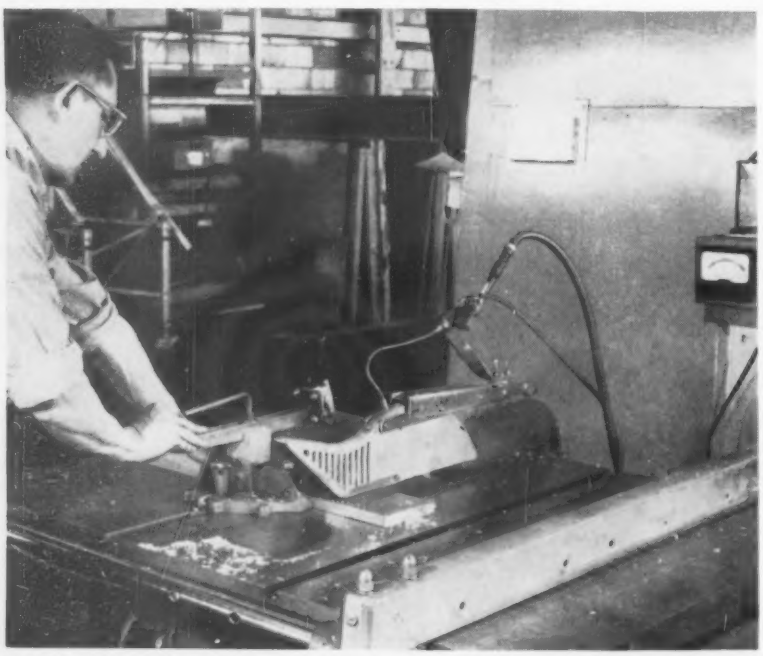
Lab tests yield actual time increments required to cut various part sizes at various meter readings. Optimum rate is then selected. This information is given to the operators in terms of a single meter reading.

With cutting time no longer a variable, end result is an accurate means of determining machine capability. This allows plotting a charted relationship between surface finish and feed rate in terms of meter readings (percent load).

Material finish, at a given meter reading, improves in proportion to material thickness. This is because the feed rate is slower. Slowing the feed rate reduces the depth of the cut. The result is a better finish.

Predict Ability—By following a prescribed method, trained operators produce work of a given accuracy, with a given surface finish, in a given period of time. End results under such conditions can be predicted. And, such results are repeatable. They depend on the control offered by the load meter.

For example, assume stock thick-



CONTROL FEED: Surface finish, dimensional accuracy, blade life and cutting rate depend on the manual feed rate—measured by a load meter.

ness is 2 in; length of piece required is 12 in. ±0.015; and desired finish is 80 microinches.

The accuracy chart indicates ±0.015-in. tolerance can be held on a 12-in. piece at loads of about 60 pct and below. A surface finish chart shows that a 60-tooth saw blade yields the desired finish for a 2-in. material thickness at feed rates up to about 50 pct. Therefore, this stock is cut with the 60-tooth blade at a meter reading of 50.

Serves as Safety — Obviously, a meter reading of 100—loading in excess of 100 pct of rated motor capacity — overloads the motor.

By giving the limitation in terms of percent load, the meter also serves as a safety device. Proper use saves wear on the blade and on the machine.

There's one trouble spot. Unusual shapes tend to move during the cut if too heavy a load is applied. For example, round stock tends to roll.

Control Router—Use of a load meter on a router establishes a method of controlling finishes, tapers and tolerances. These are also functions of the feed rate. An operator uses a meter reading in a similar manner to its use on the table saw. Here's how.

When rounding a corner, he reduces the feed rate to about 30-35 pct of maximum meter reading. This prevents head inertia from carrying past the corner. When the corner has been rounded, the operator resumes the normal specified feed rate.

About ⅛ in. from the end of the cut, he again reduces the feed rate to about 30-35 pct. This prevents the bit from "hogging in" and breaking.

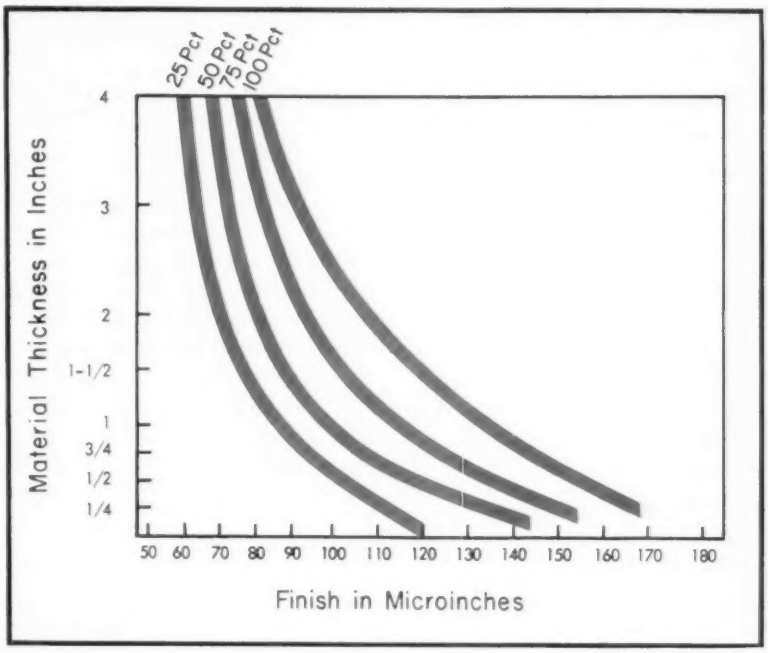
Finish Cuts — When finish cuts are required, router feed rates shouldn't exceed 30 pct. This allows the bit to clean up the edge.

There's little routing relationship between material thickness and finish. Finish varies directly with the cutting rate. A simple chart can be made to plot router meter readings versus surface finish in microinches.

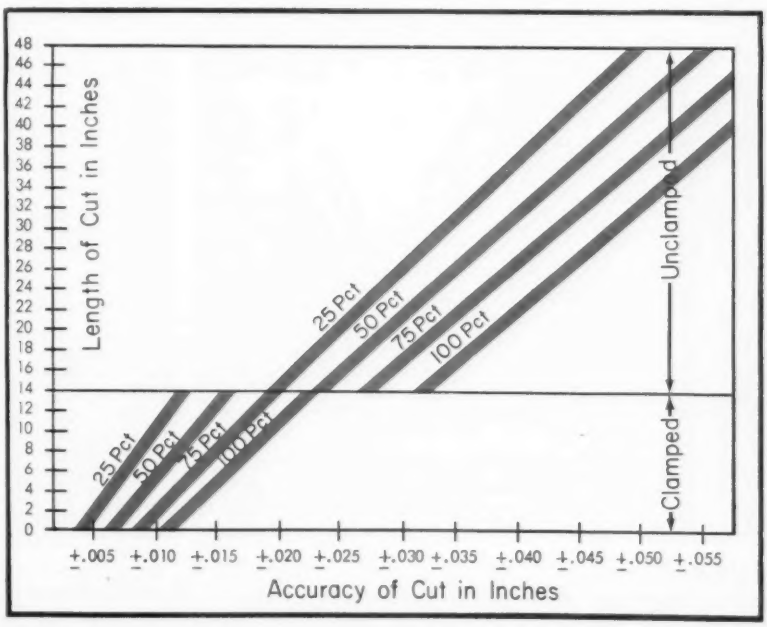
As the router bit passes through the work, it cuts with a taper caused by deflection of the cutter. The piece being contoured is thus smaller at the top than at the bottom.

The amount of taper depends on the thickness of the material. It's also a function of the feed rate.

Meter Readings Control Finish



Predetermine Saw Cut Accuracy



How to Weld Galvanized Steel

Research Points Up Ways to Reduce Weld-Cracking

By J. F. Rudy—Metals Div., Armour Research Foundation of Illinois Institute of Technology, Chicago

Welding of galvanized steel can be a nuisance. Certain joints are very prone to failure.

A recent study provides answers as to why cracking occurs and how it can be reduced.

■ Welding of galvanized steel presents several problems that have plagued users of this material for many years. They include: a wide and erratic arc; operator discomfort from fumes; a high incidence of porosity; weld bead cracking.

This paper deals with the cracking problem observed in the roots of fillet welds. What happens is that a large number of "zinc penetrators" or galvanized cracks often occur near the fillet throat. Result: an unacceptable weld.

Two Approaches—Research into this problem was recently completed at Armour Research Foundation of Illinois Institute of Technology, Chicago. And a paper was given before the American Welding Society at the Fall 1959 meeting.

This study took two directions. It sought to develop: a special electrode which is not susceptible to zinc penetration; or a deposition technique that would let commercial electrodes do the job.

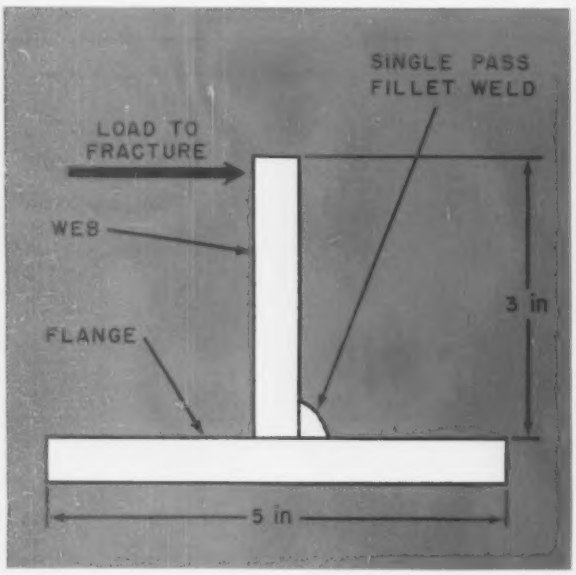
The cracks have several characteristics. They always seem to progress from the weld root; the problem occurs with only fairly thick (½ in. or greater) steel plates; the cracks appear to follow an intergranular path; they are noted with only a certain weld geometry, i.e., one which includes a galvanized faying surface at the weld throat.

The cracks obviously result from some sort of interaction between the weld deposit steel and the zinc surface layer. It's doubtful that gaseous zinc causes the crack; certain traits of the flaw veto this.

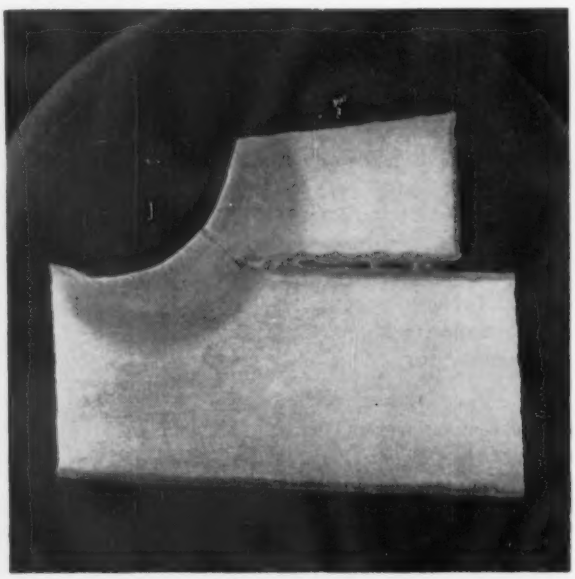
Liquid Zinc Interacts — The greatest chance for finding a cracking mechanism appears to involve a solid steel-liquid zinc interaction —grain boundary penetration by liquid zinc. However, the noted dependence on base plate thickness suggests that cooling stresses are a factor.

The culprit, then, appears to be something akin to stress corrosion. The faying plane provides a reservoir of liquid zinc which operates

Galvanized Tee-Joint is Crack-Prone



PUSHES ON WEB: Testing of single-pass fillet weld (18 in. long) calls for folding plates towards fillet.



PLANE OF WEAKNESS: Through crack shows up as result of fracture following the "zinc penetrator."

at the notched fillet throat. Weld cooling develops shrinkage stresses which load the notched area to the yield point.

Work, performed by W. Rakeker in 1953 and recently confirmed at Armour, points up another factor: the greater the alloy content, the higher the susceptibility to cracking.

Zinc Penetrates — When liquid zinc is in contact with steel under these conditions, rapid penetration into the grain boundaries occurs. The resulting boundaries are unable to withstand the stress and open. Zinc passes into the crack. Penetration continues in this fashion.

Thus, possible solutions to the problem include: removing the faying surface zinc; removing the stress concentration by designing the joint to eliminate the notch; depositing a low-alloy weld metal—ideally pure iron.

The greatest part of the study was in regard to the penetration behavior of about 45 commercial brands of electrodes. They include many of the common AWS classifications.

Test Two Currents—Each electrode was deposited on galvanized HTS steel to form a tee joint. At least two different currents were tested.

The total aggregate crack length for the whole specimen divided by the specimen length is the measure of zinc penetration. It is called "percent zinc crack."

Since the zinc penetrator problem was first met during attempted qualification of E6010 electrodes, this type serves as the basis of performance comparison.

E6011 electrodes gave results like the E6010 class. But there is some reduction in zinc cracking. Analysis shows that the manganese content is lower.

Less Cracking — The E6012, E6013, and E6027 electrodes gave even less cracking. The probable reason for this success, however, is not due to deposit chemistry, but to their low heat or low penetration (of weld metal into the weld joint) behavior. This causes reduced corner penetration which helps avoid the cracking problem by avoiding the root notch.

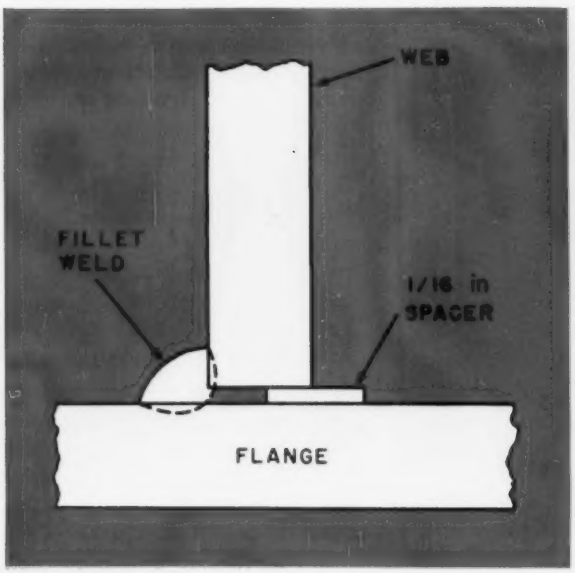
The graph shows the relationship between zinc cracking into the root of the fillet and weld bead penetra-

Spacer Reduces Root Cracking

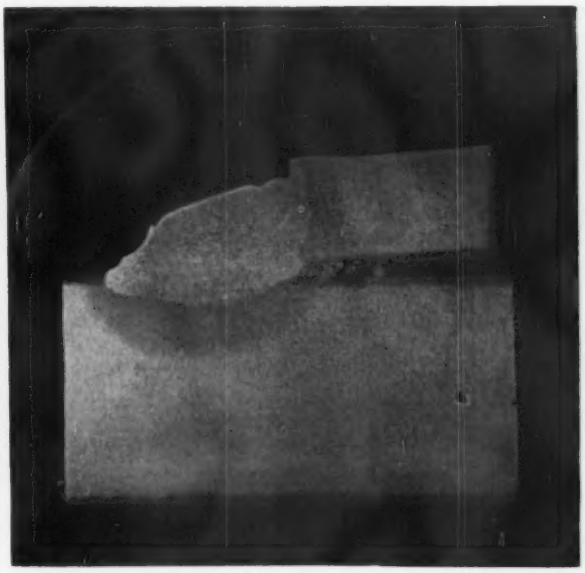
ELECTRODE CLASS	Extent of Zinc Cracking, pct* Tight Fit	1/16 in. Spacer
E6010	36	8
E7010	27	12
E6011	18	6
E6012	10	2
E6013	8	2
E6027	0	—

* Average for each class.

Spacer Eases Welding Problem



TWOFOLD JOB: Purpose of spacer is twofold: to spread faying surfaces; to reduce bead penetration.



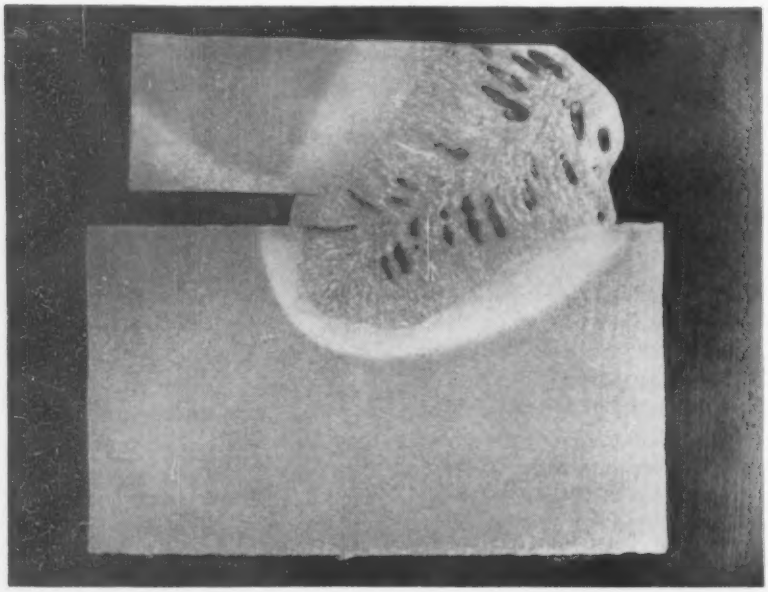
CUTS DOWN CRACKING: Another test fillet, welded with 1/16 in. spacer, shows no zinc cracks.

tion into the root corner. It points up the lesser degree of cracking of the E6012 electrode, for example, over the E6010 electrode.

What about the higher strength electrodes? According to our basic understanding of liquid metal penetration into grain boundaries, an increase in solid metal matrix strength by alloying makes the metal more prone to attack. Test data on high strength electrodes support this claim.

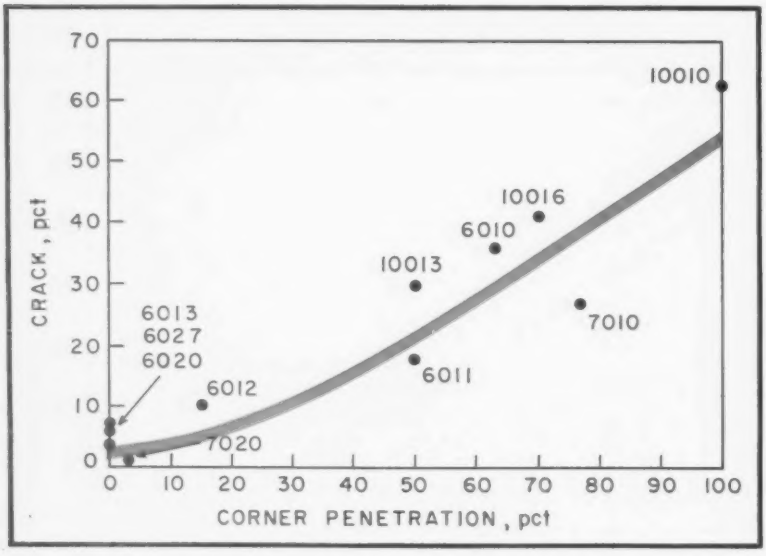
Pure Iron is Ideal—Thus, the optimum weld deposit should be pure iron. But, getting pure iron in a weld deposit is complicated by the need for weld puddle deoxidation. And the most common deoxidizers, manganese and silicon, are both weld metal strengtheners.

Several types of specially formulated coated electrodes were prepared. Some had minimum amounts of manganese and silicon. These electrodes may have been somewhat less susceptible to cracking. But such evidence was obscured by side effects such as porous welds or "cold" electrodes.



NEED DEOXIDIZERS: There are no signs of zinc cracking. But welding with bare Armco iron gives rise to another problem—heavy porosity.

Electrode Choice is Factor



FUSES WEB CORNER: Electrodes vary in their ability to penetrate. This trait is measured by lineal percent of web corner which is fused.

Any Other Solutions?—Is it possible to cut down on cracking by controlling arc heat, weld puddle position, or changing joint design?

Welding current variations between 160-210 amps had no large effect on zinc penetration. This may be partly due to the operator tending to compensate with a welding travel speed adjustment.

A few welds were made with the electrode angled 70° from the vertical. This technique cut down zinc penetration from an average of 42 pct (with that particular electrode) to only 1 pct. However, puddle control was difficult.

Change Joint Design—The most successful means of altering root geometry was to space the faying surfaces. In this study, the gap was maintained by insertion of a 1/16 in. shim. But cross wires or any other spacers would be just as effective and possibly more convenient.

This joint relieved the zinc penetration problem for all electrodes as shown in the table. The reduction of cracking—from an E6010 class average of 36 pct to 8 pct—is noteworthy. The reduction of the E6012 electrodes from 10 pct to 2 pct is also significant.

The improvement with this technique is due to the opening of, or reduction of the severity of, the notch at the fillet root.

Thus, the two most effective means for reducing zinc cracking appear to be: the substitution of the lower penetrating electrodes such as E6012 instead of E6010; and the placement of 1/16 in. spacers.

Blender-Dryer Reduces Handling

Combination Unit Speeds Preparation of Powdered Metals

A packaged unit consists of a combination liquid-solids blender and a vacuum tumble dryer.

The unit prepares powdered metal mixes in minutes—instead of the hours normally required.

■ Producers of tungsten carbide and other powdered metals have found a way to bypass time-consuming processes and materials-handling steps. A new device eliminates blending by ball mills and the follow-up addition of lubricant-bonding agents. Tedious drying time is also reduced.

The packaged unit consists of a liquid-solids blender and a vacuum tumble dryer. This unit prepares press mixes in a fraction of the time normally required. In some cases a mix is ready in minutes—instead of hours.

Design of the new unit, built by The Patterson-Kelley Co., East Stroudsburg, Pa., makes use of a twin-shell, V-shaped cylinder and a hollow cylinderical dispersion bar. The bar is mounted across the blender axis through which fluids enter the pre-blended mass.

Dryer Added—To this basic design, the manufacturer adds vacuum drying features. He wraps a heating jacket around the V-shaped shell. Then, he adds a vapor take-off and other dryer parts. These include filters, condensers, receivers, a vacuum pump and other instruments.

Conventional methods of blending tungsten powder with carbon black require hours of ball mixing; then handling and screening to separate the carbide from the balls. Next, the blended powder must be mixed with a dissolved wax which serves as a green bonding agent. Mixing wax and powder involves more handling and other cumbersome equipment.

Finally, the mix must be dried. This means transfer handling to a tray dryer. The mix is sometimes pelletized on screens to get it ready for pressing into tool bits or other parts.

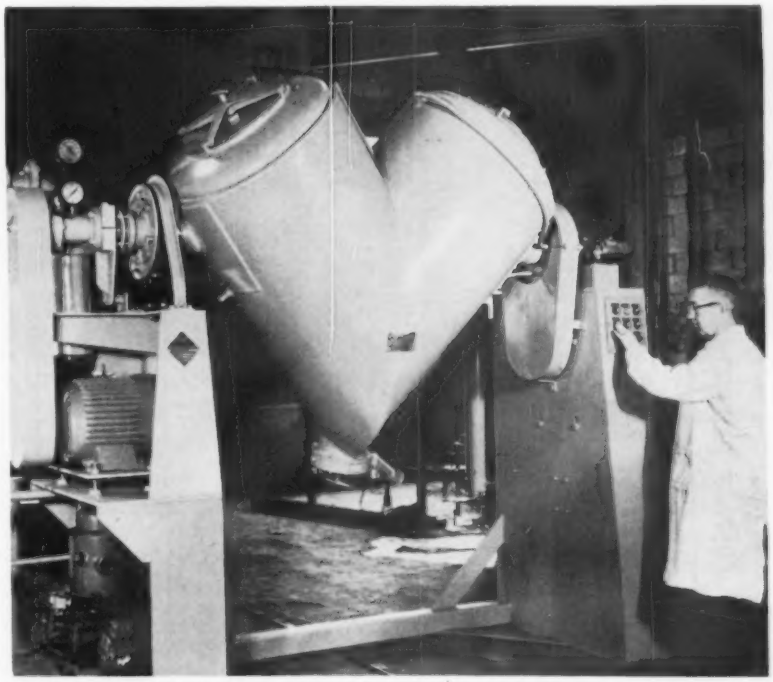
Two-Step Operation—The combination blender-dryer cuts the steps to two functions. And, the same unit performs both steps. It blends, lubricates and granulates in the first stage: In the second stage, it removes and recovers solvent in a vacuum drying system.

Users of the new unit blend the dry ingredients with the dissolved wax in a continuous operation. This produces a granulation with good flow properties. Since these steps are common to the powdered metals field in general, the unit has wide potential use.

Either of two openings at the ends of the V-shaped unit charge the dry, solid ingredients. The solids can be tumbled to pre-blend for desired homogeneity under a variety of needs.

Uniform Blend—Next, the unit's spinning liquid dispersion bar introduces the liquids to the pre-blended mix. The bar provides uniform mixing of the liquids with the solids.

When the proper amount of liquid has been metered to the batch and the blending cycle is complete, the operator presses a button to start the drying cycle. During this stage, the unit rotates and the water circulates through the jacket at a fixed temperature.



SPIN AND TUMBLE: Combination unit blends, lubricates and granulates in the first stage. In second stage operation, it removes and recovers solvent—from the powdered metal mixture—in a vacuum drying system.

Nylon Parts: Machine or Mold?

Volume and Part Design Play Main Roles in Choice

By E. C. Graesser—Chief Engineer, National Vulcanized Fibre Co., Wilmington, Del.

Total output and complexity of a given design determine the method of making nylon parts.

Machining handles short runs and symmetrical parts. Injection molding suits volume work.

▪ When you choose nylon as a design material, several factors go into deciding the best production method. Most important is volume —total output of a given design. Next in importance is actual design—complex or simple.

Other variables include: size, finish and delivery. But in general, the two main factors of volume and design dictate production methods.

Common methods of making nylon parts are by injection molding or by machining of extruded mill shapes. Injection molding utilizes nylon resins in bulk form. These resins are heated to a liquid state; then forced into mold cavities.

Machining refers to conventional methods of turning, drilling, tapping, reaming, blanking and punching. To produce a nylon part by machining involves one or more of these operations.

Consider Volume—Setup costs affect the primary choice of a production method. These costs are evaluated mainly on the basis of volume. For example, a multiple-cavity mold costs up to $2500—depending on the number of cavities and the mold's complexity. A minimum work run is required to break even on the cost of the mold.

Most regular tools can be used to form nylon parts from mill shapes. Special blanking dies are an exception: These cost from $50 to $250. The majority of shop machines are flexible enough to handle nylon. However, simple fixtures may have to be adapted to the basic machines.

Unless automated tool fixtures are used, the end result is piecework. Labor costs per part remain fixed—regardless of volume. Machining pays off for short runs where mold costs can't be amortized or where quick delivery is needed.

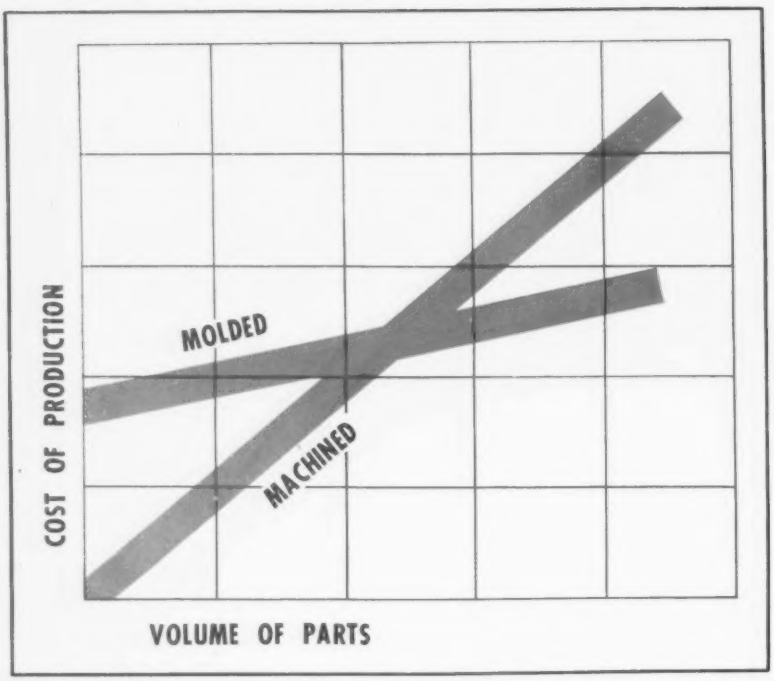
Costs Go Down—On the other hand, injection molding gives lower unit costs for long runs. Labor costs aren't fixed for each part as in machining. As volume increases, unit costs decrease.

Aside from actual setup costs, injection molding presents another problem that's important in some cases. Machining produces parts without delay. But, acquiring a new mold takes time for design and fabrication. This is important if quick delivery is needed and machining operations are competitive.

Design Dictates — Occasionally, the design of a nylon part dictates the method of production—regardless of volume. Symmetrical parts such as pins, washers, discs and many profile shapes are easy to machine. On the other hand, it's difficult to machine intricately-designed parts and contour shapes consistently. These parts must be injection molded.

Injection molding mass-produces

Plot Your Production Method



LOGICAL CHOICE: If part design suits either method of production, a simple chart can be prepared to determine the more economical method.

contoured and non-symmetrical parts with consistent dimensions and close tolerances. The molding cycle reproduces exactly the same part time after time. This isn't true in machining. A machining error can always happen and can be compounded by subsequent working.

Exceptions are threaded parts, multiple undercuts and "blind" holes. These are usually machined for the close tolerances required for precision assemblies. The reason is because injection molded parts suffer a slight amount of shrinkage after cooling. Even though the shrinkage is slight, it's hard to predict. And, it may necessitate reworking of the mold.

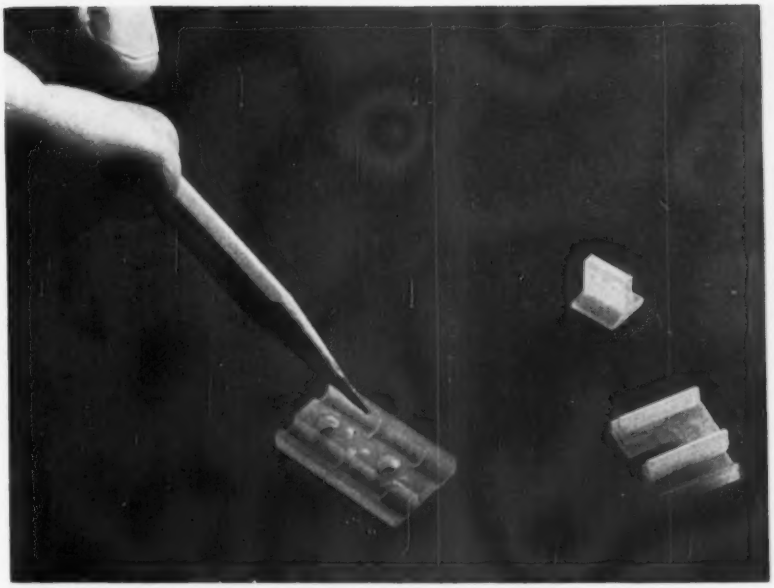
Special Headaches—Some parts can't be machined without special equipment. Examples include parts that have internal recesses with planes and corners and very small, complex parts. For these parts, injection molding provides the only good production method.

Machining produces parts with varying cross-sections with little difficulty. But, injection molded parts—with non-uniform cross-sections — experience some warpage while cooling.

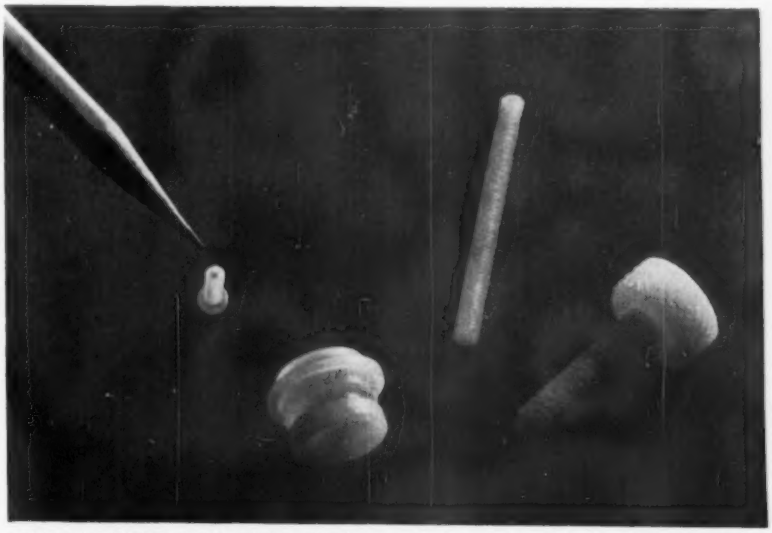
Often, the design of a nylon part is subject to a refining process brought on by testing or customer request. This is hard to control and, unless anticipated, it affects the profit picture. Usually, machining produces nylon parts in design stages. This eliminates the high cost of frequent mold changes.

It's easier to change the setting on an automatic screw machine than it is to change molds—and far less costly. Once the design is stabilized and trial orders are accepted, then changeover to injection molding may be clearly indicated.

Size Is Problem—Size of a part often determines how it will be produced. Some parts are so large that injection molding isn't feasible. This is due to the floor space required for mass production. On the other hand, some parts can only be injection molded because they're too small for machine-tool fixtures.



INTRICATE PARTS: Molding eliminates excessive machining while forming intricate parts or contour shapes. Extruded nylon shapes are adaptable to automated mass production. As volume increases, unit costs drop.



CLOSE TOLERANCES: Machining produces close tolerances for precision parts with details such as blind holes. Molded parts usually shrink after cooling. Shrinkage may be slight, but it's very hard to predict.

Finish may be a factor. While molded surfaces are nearly perfect, most injection molded parts are ejected from the molds connected by sprues and runners. These must be removed. Depending on the use of the part, it may be necessary to remove all traces of the excess material. This requires additional labor for buffing and polishing. Using equipment such as tumbling barrels lowers the added labor costs.

Machined parts are usually finished to exact dimensions. No extra labor or added equipment is needed to remove excess material. However, toolmarks may require buffing for a satisfactory finish.

Microfilm System Sends Data To World-Wide Locations

Aperature cards replace 620,000 mechanical and electrical prints. Carded data, sent to engineers in the field, include: specifications, drawings and standards for military items.

▪ Microfilms and punch cards speed distribution of engineering data at the U. S. Army Signal Equipment Support Agency, Fort Monmouth, N. J. This method—which saves time and space in working with 620,000 engineering drawings—also suits large industries.

To speed engineering communications, the agency prepares cards on data used by industry to make complex parts—for which the Signal Corps is responsible. Carded data include: specifications, drawings and standards.

During 1960, data for 220,000 Signal Corps drawings will go to world-wide locations. In addition, most of the locations will also receive—in card form—a complete set of 400,000 manufacturers' drawings.

Valuable By-Products—Converting full-sized original and intermediate prints into punch cards is accepted practice in both government and industry. A case in point is optical mounting of microfilm into aperature cards.

DRAWING IS PHOTOGRAPHED: A technician microfilms an engineering print. The microfilm-drawing will then be mounted in a punch card.

Less well known, however, are other uses. Monthly, the agency passes 5,000,000 cards through modified IBM reproducers, interpreters and sorters.

Within the data processing area, technicians convert master data cards into valuable by-products. Each master card, created solely to reproduce aperature cards, becomes the basic tool for upgrading other engineering paperwork.

For example the master card serves as a keystone to correlate drawing lists to equipment type-numbers. In addition, the master card replaces a visible index-card file. This eliminates hand posting.

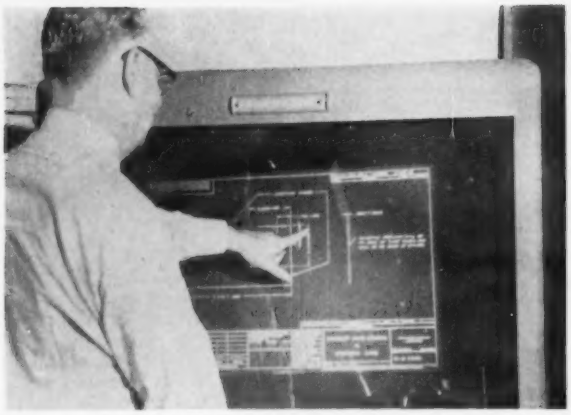
Many Uses—In short, the agency started out to furnish small reproducibles in punch cards. Today, it has found other uses for the punch cards, with or without aperatures, to improve engineering communications.

The microfilm and punch cards cut the time lag between receipt and distribution of new and revised drawings. They also speed delivery of engineering data.

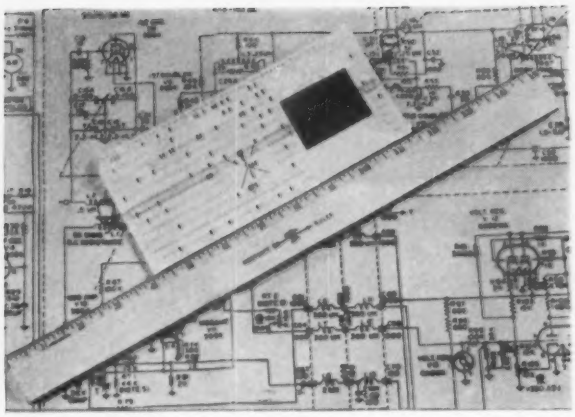
It used to take six weeks from date of approval to actual data distribution. Now it takes two weeks. Formerly, at one of the service units, it took as long as three days to furnish a print. Now it takes less than 90 seconds to deliver a reference print for instant projection.

Conversion of the 620,000 drawings represents 10.4 million cards. To keep the data files current, the agency distributes 18 sets of 40,000 new or revised Signal Corps card-drawings. Updating the files requires almost a million cards a year.

Saves Weight—Studies show exceptional savings in the supply of



FACTS IN A HURRY: Instant projection in a viewer gives a field engineer a full picture of all details.



COMPACT DATA CARD: Complete information from a 22 x 34-in. drawing appears on aperature card.

engineering data in card form. The weight saved for 1000 drawings is about 80 lb.

Cards save 16 tons of weight for each set of 400,000 manufacturers' drawings. Total weight savings for 16 sets amount to 256 tons. Additional savings of 9.6 tons annually are realized in handling 15,000 new cards to maintain these drawings.

With the 220,000 Signal Corps drawings, weight savings with cards reach 158.4 tons for 18 sets. The weight saved on revisions for these 18 sets is 28.8 tons per year.

Weight savings bring about two additional savings. The first is savings in the cost of distribution. The second is savings in supply time.

Less Space Needed — Another advantage is space. Like weight savings, space savings have two other advantages. The first is in the area for housing data; second is in filing equipment for the data.

For example, a field unit now needs 15 file cabinets. These standard cabinets will hold the 620,000 cards. They'll also store the first year's supply of 55,000 new and revised drawings — also in card form.

Full-sized intermediates require almost 500 special filing cabinets. The space saving is a 30 to 1 ratio. And, this saving reflects itself in actual filing time.

In service, studies show that filing of the cards is three-and-a-half times faster than for full-sized paper intermediates. Time required at the agency for full-sized prints was 16⅔ hours. Using the punch cards cuts this time to 4⅔ hours.

Always on Hand—Advantages of space savings and handling ease in the field are important. Each field unit will receive a full set of controllable data. Information will be shipped to them in file sequence order. With complete data, easily maintained, decentralization takes place.

Complete information, at the field units, will relieve the central disbursing point of handling routine and rush requests. Formerly, it was impossible to furnish, on a routine basis, complete sets of drawings to field units. Consequently, there were demands from the field for sections of this file.

As complete sets reach the field, the central agency doesn't have to fill local requests. Rush service is thus reserved for emergency use.

Field Control—The small reproducibles remain under file control of each interested field unit. For example, the agency keeps a record of the number of cards made each year. Average is 3000 per month. Requests for these 3000 card-drawings are satisfied within 90 seconds and at no time does a card leave its file. In most cases, projection of the card in a viewer meets an engineer's needs.

Normal sorting of a set of 400,000 manufacturers' drawings requires four man-months. Now, the job is handled in one man-month.

The master data cards were created in film-frame sequence. The sets of punch cards, made from these data masters, appear in identical film-frame sequence.

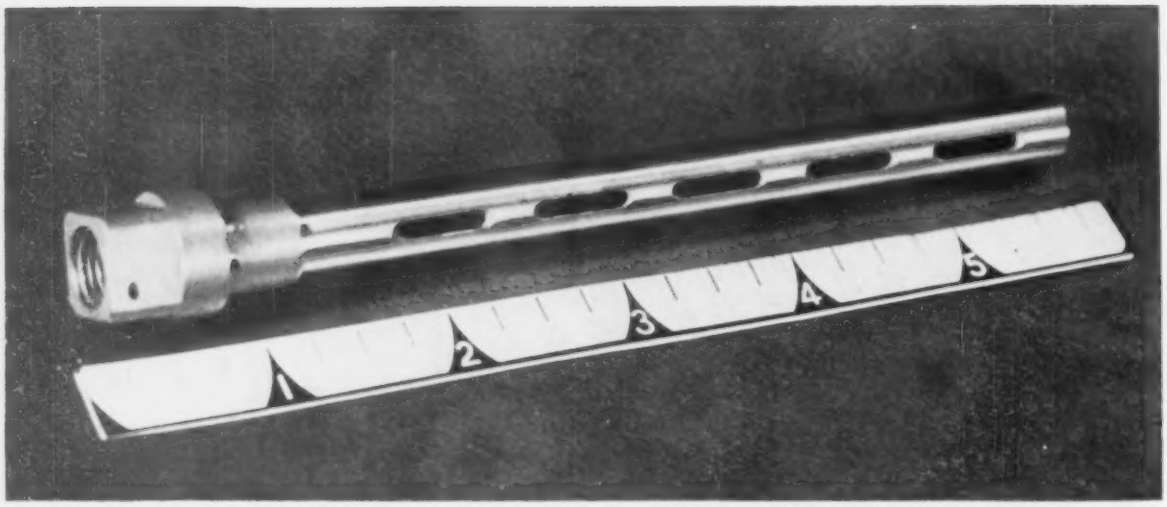
Two sorters and two reproducers put two sets of punch cards through 5,000,000 passes each month. Spoilage of film images in this operation, involving 400,000 cards per set, is less than one pct. The entire operation will be completed in 18 months.

With this straight-forward procedure, the Signal Corps provides engineering communications for 6000 items of which between 1400-1600 meet standard military use.

Double Filming—In the filming operation, two exposures are made for each frame. A positive intermediate is printed from the master camera film.

A duplicate negative film is made from the intermediate. Separation of the sets takes place at the mounting point.

In distribution, there's an area of increasing importance. Making of film duplicates from master cards is an integral part of the engineering communications procedure.



COMPLEX PART: After drilling and reaming a hole through thermostat housing, the machinist mills 15 slots in the A286 steel alloy. Hole diameter is held between 0.301 and 0.307 in. Surface finish is 32 rms.

Standard Shop Tools Machine Difficult Exotic Alloys

By **J. E. Laibach**—Chief Tool Engineer, Aero Supply Mfg. Co., Corry, Pa.

With water-base coolants and advance planning, standard machine tools drill, mill and turn work-hardening steel alloys.

High speeds and low feed rates produce complex parts with very little difficulty.

▪ Many shops have trouble machining titanium and other exotic metals. However, these metals are turned, drilled and milled without difficulty at the Aero Supply Mfg. Co., Corry, Pa. All the company does is follow good machining practice—as recommended for high-nickel, high-chromium stainless steels.

Any shop that follows such recommendations should be able to handle difficult - to - machine alloys with little trouble. Problem cases at Aero have all been traced to overlooking well-known basic principles.

Coolant is a good example. Getting heat away from the point of tool-work contact is important. The problems of metals welding to the tool—subject of much discussion—need not occur if heat is kept to a minimum.

Use Water-Base Coolant — It's well known that water is a better heat-transfer medium than oil. Most recommendations for handling difficult alloys call for water-base coolants.

Yet time and time again, metalworkers attack exotic metals with cutting oils. Such oils are readily available; they work well on many metals; and the operator is accustomed to using them.

Unless someone pays special attention to this point, it's easy to overlook the use of water-base coolants. Such an oversight causes serious trouble.

Another well-known point—which is often not followed through—is that most of the difficult-to-machine alloys work-harden readily. Tool engineers know this: And the operator has been told. But does the operator proceed accordingly?

Check Out Machinist — It's worthwhile to discuss each job with the machine operator and his foreman whenever an exotic metal is involved. This is true even with experienced machinists.

Make sure the operator understands that dwell—or even variations — in feed rate cause work-hardening and tool-edge breakdown. Review with him the steps he must perform. Discuss where and how he may inadvertently relax from con-

tinuous positive feed if he isn't careful.

This is essential. Despite careful planning, trouble often arises because an operator doesn't follow the plans.

Because of the importance of steady feed in machining work-hardening metals, Aero prefers machine tools with positive mechanical feeds. Hydraulic feeds allow variations in feed rates. Naturally, for the same reason, hand feeds are avoided. But, sometimes a hand feed is necessary.

Maintain Slow Feed—Experience shows that very high speeds and very low feeds work best. Feeds should be 0.0005 to 0.001 ipr. Higher feeds cause trouble.

Many machines have no positive feed rate lower than 0.003 ipr. Often these machines must be used because the shop doesn't have a battery of equipment suited to problem work. When the machine hasn't a low-enough feed rate, reluctantly but deliberately hand feed should be used.

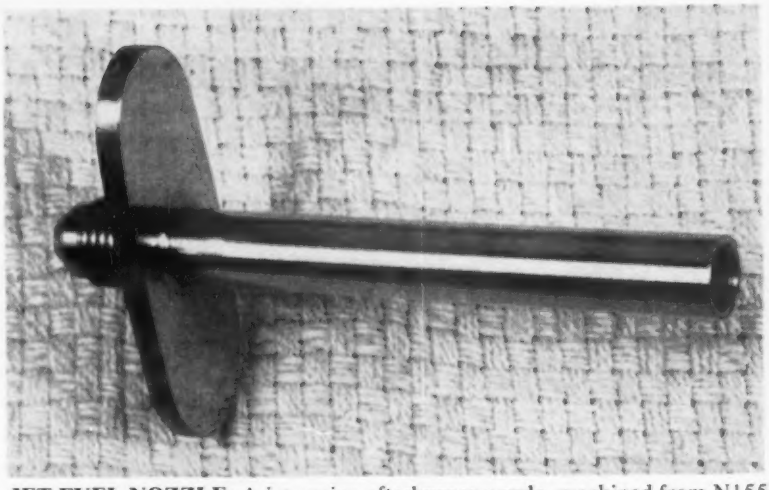
A skilled machinist, with a good feel for steady positive feed, judges his rate by chip size. As long as he gets small chips he's doing fine. Curls indicate that chips are welding together. This means too much heat is being generated at the cut.

Higher rpm than those used for normal machining are important. Increasing speed reduces danger of work-hardening and minimizes rubbing.

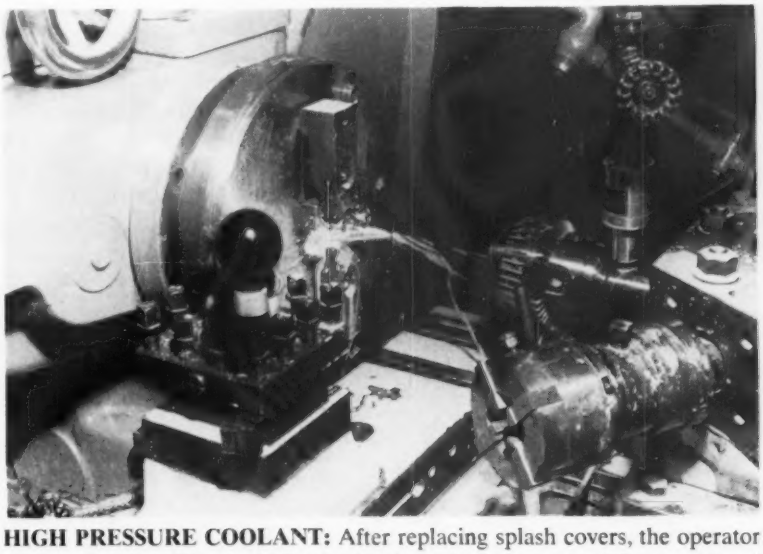
Start at Top Speed — Here's a psychological trick. Have the machinist start at the highest speed or which his machine is capable; then reduce speed until the job is running well.

Apparently an operator becomes more and more timid as he increases speed above the speeds he's accustomed to. If he starts at low speeds and works up, it will result in running the job at the minimum satisfactory rpm—rather than the optimum speed. Starting high and working down eases this problem.

Universal grades of carbide tools prove useful for this work. Tool geometry should follow the recommendations made for high-alloy stainless steels. These include greater than usual point angles for drills and smaller than usual clearance angles on milling cutters.



JET FUEL NOZZLE: A jet engine afterburner nozzle, machined from N155 forging, has a hole with a step in it. Part way through the hole is held between 0.2495- and 0.2505-in. diam. End threads are ground.



HIGH PRESSURE COOLANT: After replacing splash covers, the operator steps up coolant flow to 150 psi. Turning takes place at 1500 rpm. Use of the rotary coolant transfer suits all turret lathe positions.

Recommend Negative Rake—Aero uses negative rake, if the machine has enough horsepower and the spindle bearings can take it. Using standard machine tools restricts work with the difficult alloys to tools with high rigidity, good bearings, high horsepower, high spindle speeds and positive mechanical feed.

Addition of a high-pressure coolant supply to two machines helps in deep hole drilling. For example, Aero uses pressures as high as 625 psi with a gun drill for a through hole in long A286 parts.

One tool that's proven itself very useful is the Mossberg cold point drill. It handles tough alloys with amazing ease. This is due to special tip geometry and a provision for getting coolant to where it's needed most.

Fixture Handles Two Chuckings

Allows Turret Lathe to Face and Bore at Same Time

Clever tooling lets one lathe do work of two. Dual operations cut cost of machining cast-aluminum flywheel housings.

Parts handling tumbles. Overall efficiency is improved.

▪ Clever tooling helps a standard turret lathe perform facing and boring operations — on two large workpieces—at the same time.

Parts machined in this fashion are cast-aluminum flywheel housings for engine-driven generators. These parts go into arc-welding equipment and aircraft ground-power units.

By handling two housings simultaneously, Hobart Brothers Co., Troy, O., saves floor-to-floor handling time. The unit saves 28 pct in overall machining costs. In addition, the clever tooling lets one lathe do the work of two.

Double Duty — Tooling consists of a two part fixture. One part revolves in the lathe bed: The other doesn't turn, but it moves horizontally.

The first fixture is mounted on the face of an 18-in., three-jaw chuck. A boring bar, with three cutters, projects from this fixture's center plate.

After chucking the first fixture in a saddle-type turret lathe, made by The Warner & Swasey Co., Cleveland, the lathe operator slides a housing over the boring bar. He fastens the housing to the fixture's surface plate. The boring bar extends through the housing's center hole.

Next, the operator clamps a second housing in another (non-revolving) fixture. This fixture holds the housing which will be bored and chamfered. Now, dual machining begins.

Dual Operation — When the operator starts the lathe, the chucked fixture—with integral boring bar and attached housing — revolves. As the facing cut progresses on the revolving housing, the non-revolving fixture—and its attached housing—advances toward the boring bar. Feed is set at 0.009 in. on the apron.

Spindle speed is fixed at 264 rpm. This produces a facing cut of 1250 sfm and boring at 325 sfm.

As the lathe feeds toward the spindle, the rough boring cut is completed. The lead cutter on the boring bar performs the rough cut on the housing's off-center starter hole.

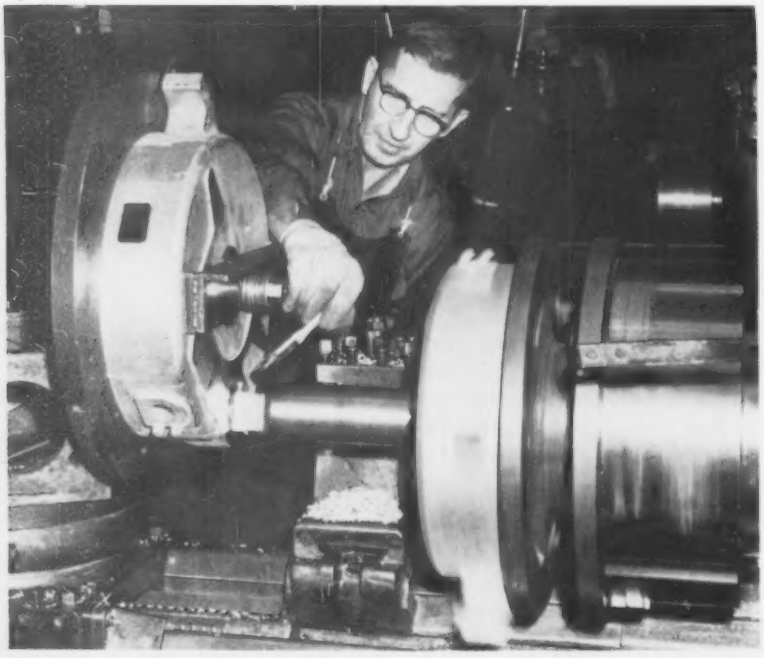
Finish boring is handled by the next cutter; then the third cutter produces the chamfer. All three cutters are carbide grade C-6 in DeVlieg microbore units. This arrangement allows quick, accurate settings and easy maintenance.

Extra Benefits—Combining two chuckings on one machine benefits Hobart three ways. Use of the special tooling eliminates the need for a 38-in. swing gap-bed lathe.

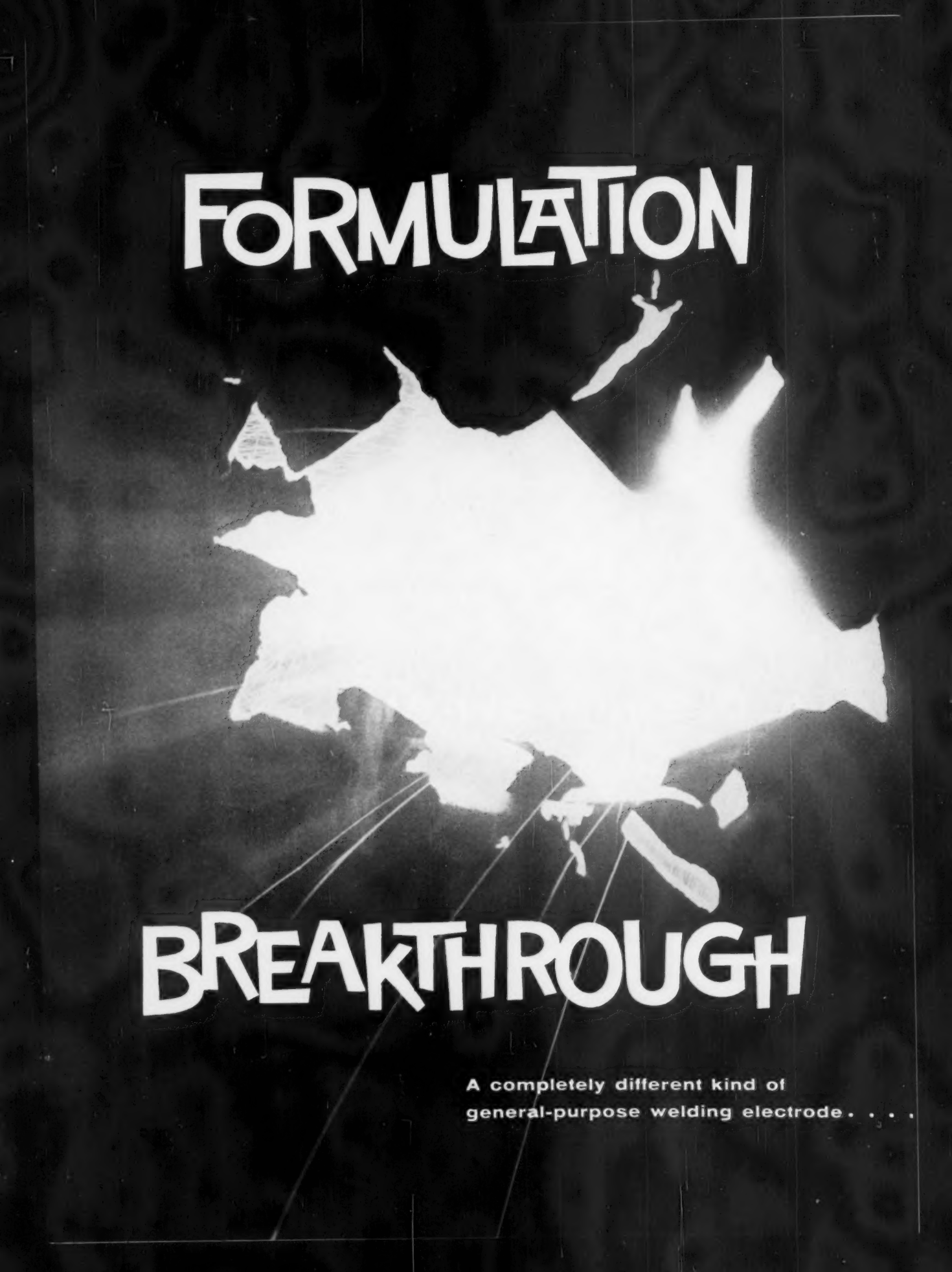
Parts handling has tumbled. The housings go from skids to the fixtures, then back to the skids.

Boring becomes a free operation. Facing requires about the same amount of time as was required prior to the dual machining.

Improved efficiency permits the company to maintain their 1955 manufacturing costs for the flywheel housings. This is true despite increases in both labor rates and material costs.



FACE, BORE AND CHAMFER: As the turret lathe feeds toward the spindle, the revolving workpiece is faced. Simultaneously, the revolving bar—extending from the chuck—bores and chamfers a second flywheel.


FORMULATION
BREAKTHROUGH
A completely different kind of
general-purpose welding electrode. . . .

A. O. Smith SW-612 — hottest news

Another welding milestone by A. O. Smith! It's the completely new and different SW-612 – a mild steel rod that handles like an E-6013 with the characteristics of a Class E-6012 electrode. Our engineers aptly describe it as a "formulation breakthrough" – a clean break with the past – completely different in appearance and performance. A beautiful bead with virtually no spatter, reducing slag removal and

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*A. O. Smith introduced the first paper-wrapped electrode way back in 1919.

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FREE TECHNICAL LITERATURE

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, p. 175.

Carbide-Insert Holders

A 32-page illustrated booklet describes three lines of holders for use with carbide inserts. Featured in the bulletin are holders for square and triangular throw-away inserts. Also described are standard and non-standard holders for solid carbide inserts. Specifications, applications, ordering and dimensional data are included. (Wesson Co.)

For free copy circle No. 1 on postcard p. 175

Rams and Pumps

Advantages of using a new line of hydraulic rams and independent pumps are detailed in an illustrated, eight-page catalog. The two-color brochure provides full specifications for the 12 rams with capacities from 10 to 100 tons. Two hand and three power pumps, attachments and accessories are also described. Also included is a table showing how a series of rams can be actuated by one pump. (Duff-Norton Co.)

For free copy circle No. 2 on postcard p. 175

Automation Tools

The subject of an eight-page brochure concerns a low-cost approach to automatic drilling, tapping, and fastening operations. The literature defines and contrasts automation tools with other air-powered tools made by the company, then summarizes the features of their new line. Engineering information is presented on the two types of head design (standard and hydraulic), capacities under varying functional conditions, methods of selection, available accessories, and other specifications. (Buckeye Tools Corp.)

For free copy circle No. 3 on postcard p. 175

Filtration Equipment

Contained in an eight-page catalog is a brief description of each of the products in a line of filtration equipment. The line includes filters for continuous micro-clarity of all types of industrial fluids—chemicals, gases, oils, and water. Information is classified according to applications, operating pressures, and sizes. Various types of filter media are also described and illustrated. (Commercial Filters Corp.)

For free copy circle No. 4 on postcard p. 175

Structural Adhesives

A 16-page, three-color, fully-illustrated catalog contains complete information on structural adhesives and structural-adhesive design concepts, joint designs, and bonding methods. Included in the catalog are: extensive technical information, tables and line drawings dealing with types and properties of the company film, one-part heat curing and two-part chemically-curing adhesives; proper design methods for structural-adhesive bonding, typical

structural - adhesive joint designs, and fabrication methods. (For free copy write on company letterhead to Minnesota Mining & Mfg. Co., 900 Bush Ave., St. Paul 6)

Flexible Machining

Flexible shafting, flexible-shaft machines, handpieces, and accessories are covered in a 34-page brochure. The literature describes light and heavy-duty machinery; floor, bench, overhead trolley, and portable wheel types. (Jarvis Corp.)

For free copy circle No. 6 on postcard p. 175

Bearing Balls

Bearing balls, metals-finishing materials, and decorative steel shapes are described and illustrated in a short bulletin. The advantages of construction, performance, and adaptability of each product are discussed in detail. Also given are representative applications, size and dimensional data, and a list of the company sales agents. (The Abbott Ball Co.)

For free copy circle No. 7 on postcard p. 175

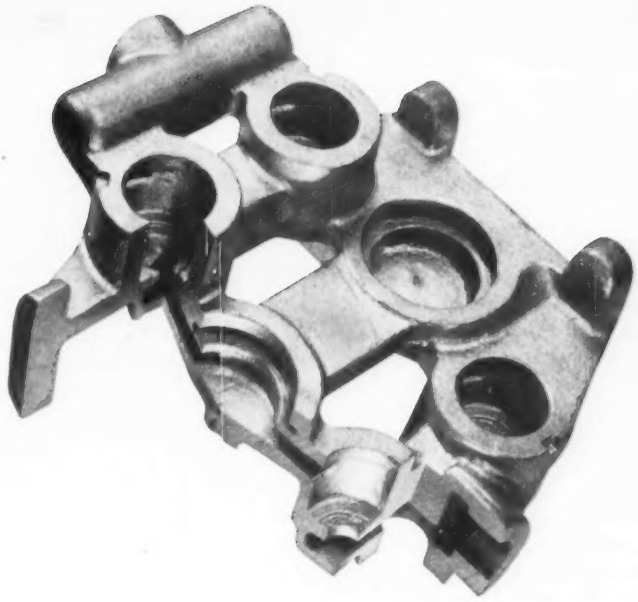
Fastening Aluminum

Covered in a 48-page technical handbook are the various types of standard and special fasteners and fastening systems used to join aluminum assemblies. The text is supplemented by 38 illustrations and 12 tables. It includes a list of manufacturers of special screw fasteners, and recommended hole sizes for various types of self-tapping screws in sheet aluminum and other materials. (Reynolds Metals Co.)

For free copy circle No. 8 on postcard p. 175

Printed Circuits

Discussing the benefits resulting from the use of printed circuits, a two-color bulletin also provides a list of information needed by the manufacturer when quotations are to be made. Also described are the types of insulating materials and the current capacity in relation to width of copper conductive pattern. The folder also lists the choice of



CAUSTIC SOLUTION

A CASE IN POINT—This is a 19 pound Ni-Resist valve body designed to handle caustic fluids at 400 psi. It was cast for the John Bean Division of Food Machinery & Chemical Corp. Ni-Resist is ideal for this application because it combines high corrosion resistance with superior resistance to erosion from high velocity fluids.

The intricate coring required demands unusual skill to produce Ni-Resist castings leak-proof at 400 psi operating pressures. Hamilton Foundry succeeded in producing pressure tight castings, an accomplishment difficult for the best of foundrymen.

When new and unusual design problems arise in the selection of metal and the casting of parts, you will find that the skill and integrity of your foundry is your best insurance that specifications—and delivery schedules—will be met.

GRAY IRON • ALLOYED IRON • MEEHANITE® • DUCTILE (NODULAR) IRON • NI-RESIST • DUCTILE NI-RESIST • NI-HARD

HAMILTON FOUNDRY INC.

1551 LINCOLN AVENUE • HAMILTON, OHIO • TWinbrook 5-7491

General Electric's program of Automation through Modernization can help you...

ELIMINATE CHARGING ERRORS, INCREASE FURNACE PROFITS

You can eliminate charging errors which result in unpredictable furnace operation and product quality. Now, with advanced system knowledge and new equipment developments, General Electric can automate your charging system. Automated charging of your furnace with raw materials in chemically correct proportions and in the correct sequence will give you uniform furnace operation, predictable quality, increased production, lower coke rate.

AS A FIRST STEP toward realizing these profitable benefits of automation, General Electric will help you survey your stockhouse, scalecar, and electric equipment for modernization needs. In this way, you can be sure that every component of your materials-handling system is compatible with the precise demands of automation. Then, by co-ordinating into your electrical system x-ray sensing equipment for continuous analysis of raw materials and computer equipment for burden calculating and charging direction, you will achieve fully automated furnace-charging.

ADDITIONAL SYSTEM BENEFITS will be realized through automatic acquisition of process data which have never before been available in readily usable form. Availability of these time-correlated data will make possible analysis of the process to determine the controlling relationships among blast volume, temperature, moisture, enrichment; composition of stack and top gases and raw materials; tuyere proportioning; and top pressure. When these controlling relationships are determined, the computer system can be programmed to provide immediate and accurate process direction.

ADOPT GENERAL ELECTRIC'S step-by-step program and begin now enjoying benefits of automation while you are building, practically and economically, toward the ultimate in profitable furnace operation — complete process direction from raw materials to finished iron.

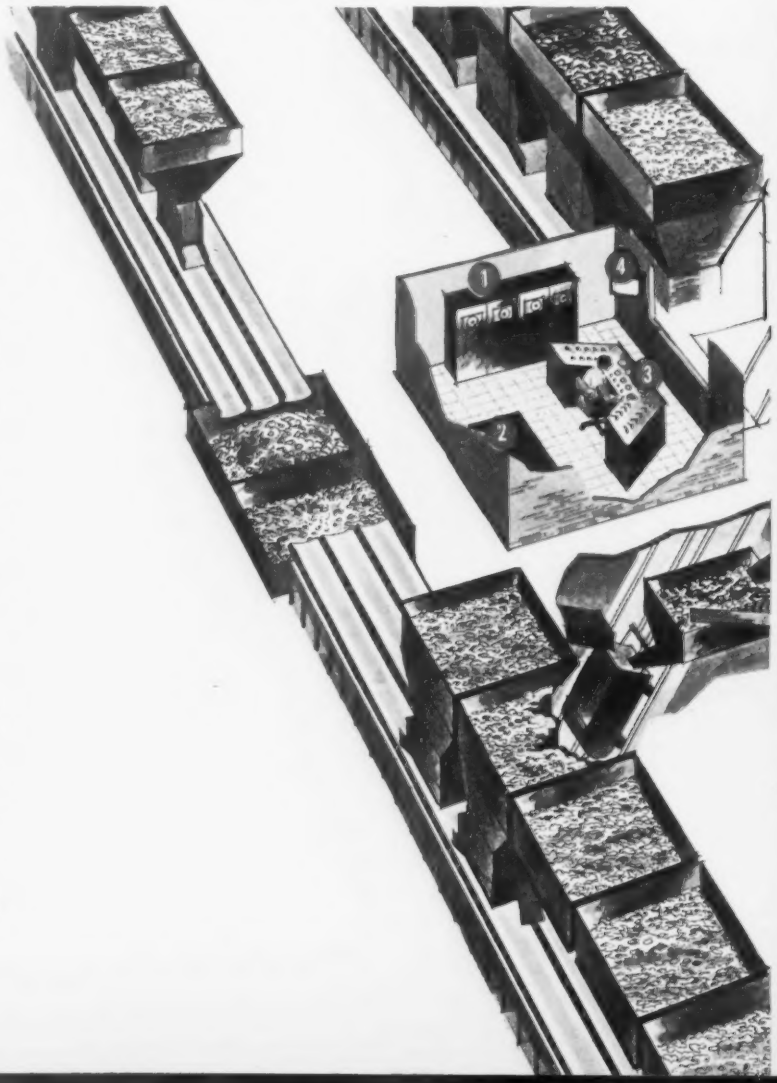
For details on this Automation through Modernization plan, call your local General Electric Apparatus Sales Office. And write for *Ring of the Future* kit, Section 659-132, General Electric Company, Schenectady 5, New York.

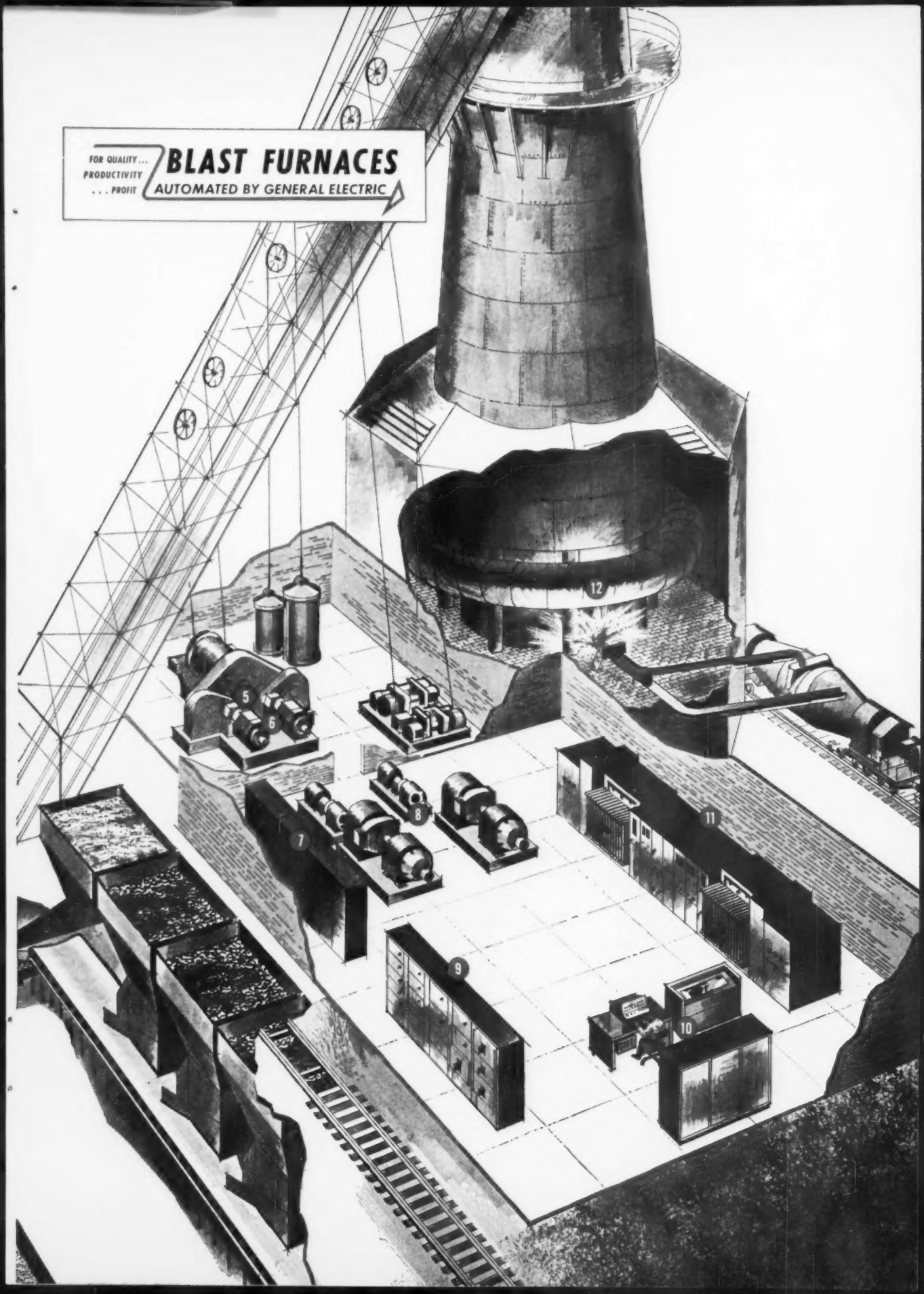
MODERNIZE FOR PROFITS

GENERAL ELECTRIC

SYSTEM-ENGINEERED ELECTRICAL EQUIPMENT

1. Recording and indicating instruments.
2. X-ray equipment for raw-materials analysis.
3. Operator's console.
4. Intra-tel closed-circuit television.
5. Heavy-duty brakes.
6. D-c mill motors.
7. Skip-hoist and d-c auxiliary drive control; DIRECTO-MATIC static charging control.
8. Skip-hoist motor-generator sets.
9. Motor-control centers.
10. GE-312 digital computer system.
11. Selectively Co-ordinated load-center unit substation.
12. Blast from steam-turbine or electric-driven blowers.




FOR QUALITY... PRODUCTIVITY ... PROFIT
BLAST FURNACES
AUTOMATED BY GENERAL ELECTRIC
5
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PETERSON
STEELS, INC.
THE 52100 HOUSE
UNION, NEW JERSEY · WETHERSFIELD, CONNECTICUT
DETROIT, MICHIGAN · MELROSE PARK, ILLINOIS

FREE LITERATURE

metals available for the conductive pattern as well as the types of plating recommended to achieve desired results. Included in the literature are recommendations covering materials available for switch and contact patterns. (Whitney Blake Co.)

For free copy circle No. 9 on postcard p. 175

Design Manual

Available to qualified engineering and purchasing personnel is a 140-page design and purchasing manual. Concerning miniature and instrument ball bearings, the manual contains complete specifications on 370 standard company bearings from 1/10- to ⅝-in. OD, as well as 22 engineering bulletins discussing factors in bearing life and operation. The catalog section supplies dimensions, design features, and calculated load ratings for plain, flanged, shielded, and extended inner retainer bearings. (For free copy write on company letterhead to New Hampshire Ball Bearings, Inc., Route 202, Peterborough, N. H.)

Indium Ingot

Listing various suggested applications, a technical bulletin describes the three grades of indium ingot. The three grades cover a range of purity of 99.9+, 99.99+, and 99.999+ pct. Some applications are: preforms for forming alloy junctions in germanium transistors and diodes, coatings on aircraft bearings, low-melting alloys, solder alloys, thermistors, and chromium-bath additives. (High Purity Metals, Inc.)

For free copy circle No. 11 on postcard p. 175

Data Processing

A test-control and data-processing system, for the most efficient testing of missile and rocket power plants, is described in an illustrated, four-page brochure. (Consolidated Electrodynamics Corp.)

For free copy circle No. 12 on postcard p. 175

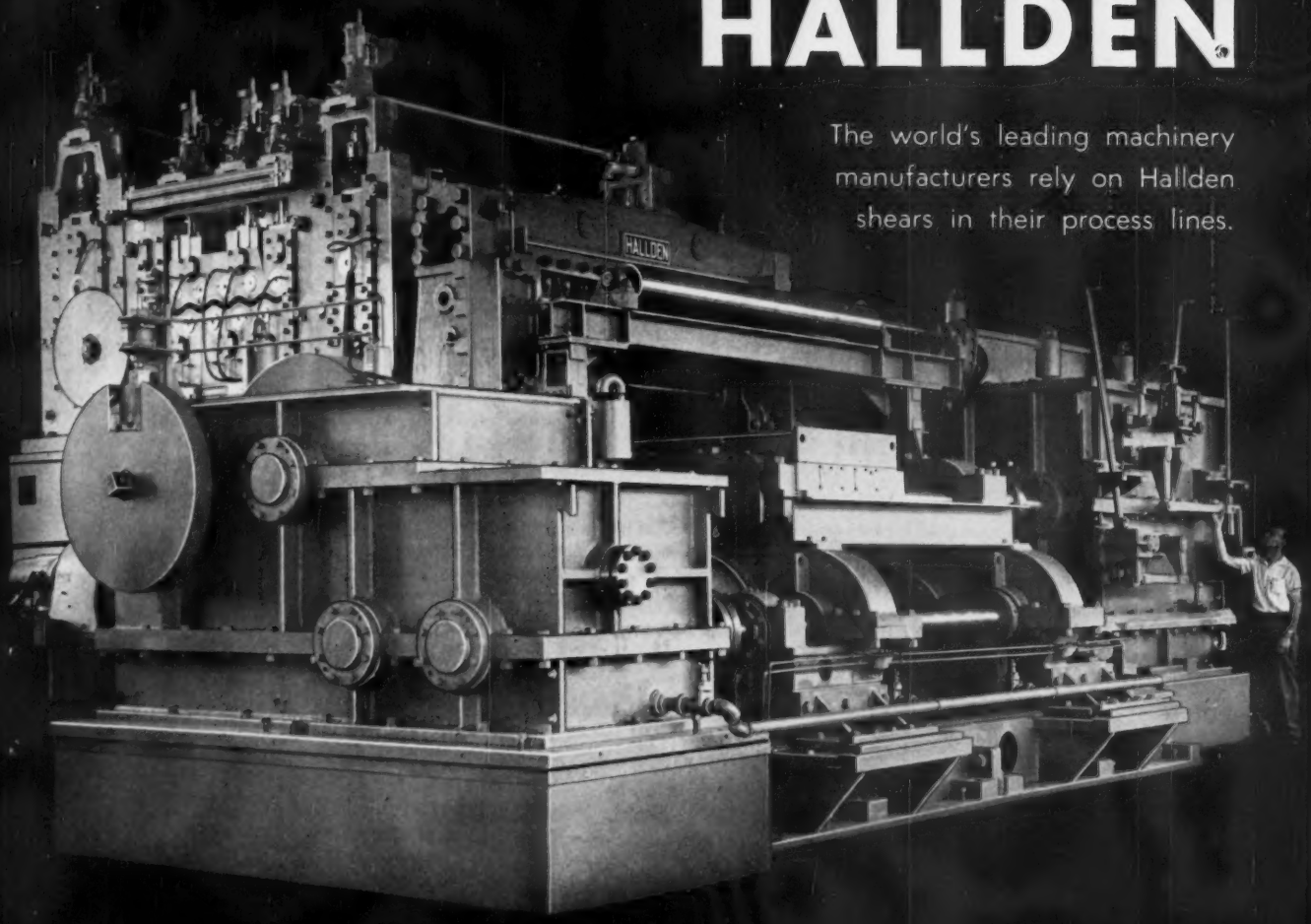
550,000 POUNDS OF PRECISION

The Guillotine Shear's superior cut on heavy gauges, synchronized on the fly

Another Hallden First — type 76 Guillotine Flying Shear, the world's largest, for continuous strip shearing — up to ⅝" thick, 100" wide aluminum — at ***two cuts per second.*** This new Hallden installation can cut mild steel up to ⅜" thick and 90" wide, with cut lengths infinitely variable up to 48 feet. Change of cut length and synchronization may be made while the Shear is in operation. For every high-production shearing application consult the shearing specialists.

HALLDEN

The world's leading machinery manufacturers rely on Hallden shears in their process lines.



THE HALLDEN MACHINE COMPANY • THOMASTON, CONNECTICUT

Associates: The W. H. A. Robertson & Co., Ltd., Bedford, England

Flash butt-welding an extruded section resulted in a 65% material reduction

By specifying an extrusion that allowed only a thin envelope of material around the finished cross-section, Amweld engineers saved 37 lbs. of 321 stainless—and eliminated considerable machining time. Amweld flash butt-welding know-how produced a ring that more than satisfied the critical strength requirements for this jet engine shroud.

Amweld is equipped to supply flash butt-welded rings and circular products in stainless, titanium, aluminum, as well as a wide variety of corrosion-resistant alloys. If you would like to know more about Amweld's welding, fabricating and machining facilities, phone or write.

GET THE FACTS ABOUT AMWELD

New 20-page catalog describes flash butt-welded rings and circular products manufactured by Amweld. Also booklet entitled, "How Flash Butt-Welded Rings are Made."

AMWELD® INDUSTRIAL PRODUCTS

THE AMERICAN WELDING & MFG. CO. • 120 DIETZ ROAD • WARREN, OHIO

FREE LITERATURE

Continued

These publications describe money-saving equipment and services . . . they are free with no obligation . . . just circle the number and mail the postcard.

Space Saving

The subject of a case-history bulletin concerns itself with how a manufacturer of meters, feeders, and controls gained 32,000 cu ft of stockroom space. This was accomplished through the combination of a remodelled stockroom and materials-handling equipment. The two-color, four-page presentation is fully illustrated with action shots taken at the manufacturer's plant. All phases of the operations are described in the text and illustrated. (Lewis-Shepard Products, Inc.)

For free copy circle No. 13 on postcard

Push-Type Broaches

A two-color, four-page brochure describes standard, off-the-shelf round, square, hexagon, and serration portable push-type broaches. Included in the literature are complete specifications and operating instructions, for applying the 55 standard push-type broaches to a wide variety of broaching applications. (California Broach Co.)

For free copy circle No. 14 on postcard

Gages and Instruments

To simplify the engineer's job of choosing the right gage or instrument, a four-page bulletin provides a quick roundup of the company's products. Featured in the bulletin are pressure and vacuum gages, indicating pneumatic controllers, and pneumatic transmitters. The two-color bulletin includes construction details and technical data. Photographs illustrate range and linearity adjustment and pointer adjustments. Tables list tube forms and materials, socket and tip materials, pressure ratings, flange types and figure numbers for ordering. (United States Gauge Div., American Machine & Metals, Inc.)

For free copy circle No. 15 on postcard

Scales

Described and illustrated in a colorful broadside (large fold-out brochure) is a full line of scales for industrial use. The wide selection of weighing equipment includes portables, bench, floor, built-in, motor truck, counting, net weight packing, and mail and parcel post scales. Several types of equipment, custom-built to user needs, are also briefly described. Fifty-six illustrations and descriptions assist the reader in determining the type of scale suited to his needs. Pertinent specifications and capacities are also listed for each model. (Toledo Scale)

For free copy circle No. 16 on postcard

Stainless-Steel Data

Providing analyses specifications for 58 different types of stainless steel, a data chart proves helpful to anyone working with stainless steel. Nearest corresponding SAE and AMS designations are cross-indexed with AISI grades for added convenience. (Peter A. Frasse & Co., Inc.)

For free copy circle No. 17 on postcard

Coatings

The subject matter of a 45-page booklet is coatings for vacuum metallizing. The booklet describes in detail the application and use of the vacuum metallizing coatings. They may be applied by spraying, dipping, and flow coating to thermoplastics, thermosetting plastics, metals, and glass. Also discussed are base coatings, top coats, and backup coats. (Bee Chemical Co.)

For free copy circle No. 18 on postcard

Corrosion Inhibitor

Developed to protect low make-up, closed cooling and heating systems, a corrosion inhibitor is the subject of a six-page bulletin. Compatible with solutions of alcohol and glycol-base antifreezes, the inhibitor controls corrosion by producing a protective film on all exposed metal

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. **3/31/60**

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NEW YORK, N. Y.

BUSINESS REPLY MAIL
No postage necessary if mailed in the United States

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THE IRON AGE
Post Office Box 77, Village Station
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Title .....

Product Manufactured .....

Company .....

Co. Address .....

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City ..... Zone .... State .....

FREE LITERATURE

surfaces. The bulletin contains recommended applications, information on the preparation of feed solutions and tests for determination of proper concentrations, and seven case histories of the product in use. (Hagan Chemicals & Controls, Inc.)

For free copy circle No. 19 on postcard

Optical Benches

A 28-page bulletin describes a complete line of optical and instrument benches. The bulletin gives general features, descriptions, and specifications of the benches and accessories. (Gaertner Scientific Corp.)

For free copy circle No. 20 on postcard

Resistance Welders

Containing detailed descriptions on 32 multi-spot and projection resistance-welding machines, a 12-page brochure supplies data on: end product, type of operation, production rate, welding machine specifications, and material-handling equipment. The bulletin also describes such special features as: automatic loading, inspection, special welding techniques, and spot, projection, and seam welds. (The Taylor-Winfield Corp.)

For free copy circle No. 21 on postcard

Lock Nuts

Listing and illustrating a complete line of lock nuts, weld nuts, and semi-finished nuts, an eight-page catalog also includes: sizes, specifications, and information on application. (MacLean-Fogg Lock Nut Co.)

For free copy circle No. 22 on postcard

Welding Units

Gasoline engine-powered welding units are described in a new brochure. The units provide dc or ac/dc welding current for jobs beyond the power line. Supplied for each welder are: dimensions, specifications, welding range, rated output, maximum voltage, and auxiliary power specifications. Also described are optional pieces of equipment. (National Cylinder Gas Div., Chemetron Corp.)

For free copy circle No. 23 on postcard

Power Tools

Described and illustrated in a 44-page power-tool catalog are: the lines of band saws, contour saws, jig saws, saw tables, saw-jointers, jointers, belt sanders, spindle sanders, shapers, shaper cutters, lathes, planers, drill presses, band filers, grinders, and spinning tools. (Boice-Crane Co.)

For free copy circle No. 24 on postcard

Wire-Packaging Guide

An easy-to-use chart explains the various "put-ups" in which many types of fine wire are available. These wire sizes range from 0.0035 to 0.023 in. Quite a bit of this wire is used for knitting, braiding, weaving and stranding. (Riverside-Alloy Metal Div., H. K. Porter Co., Inc.)

For free copy circle No. 25 on postcard

Production Facilities

A brochure describes facilities which include plants for the manufacture of: rolled and extruded products, sand- and permanent-mold castings, die castings, and fabricated assemblies. (Dow Metal Products Co.)

For free copy circle No. 26 on postcard

Thermoplastic

Describing the physical and electrical properties of a polycarbonate resin, a technical bulletin compares the new thermoplastic with seven other plastics. The bulletin points out the resin's unusual combination of characteristics which makes it suitable for engineering applications now far beyond the range of present materials. Some of its applications are: switchboard connectors, coil forms, relay bases, printed-circuit card holders, drafting film, and heat-resistant diffusion lenses. (Mobay Products Co.)

For free copy circle No. 27 on postcard

stainless

because no other metal will do the job as well—

stronger
handsome
ever-bright
non-corrodible
easy to clean

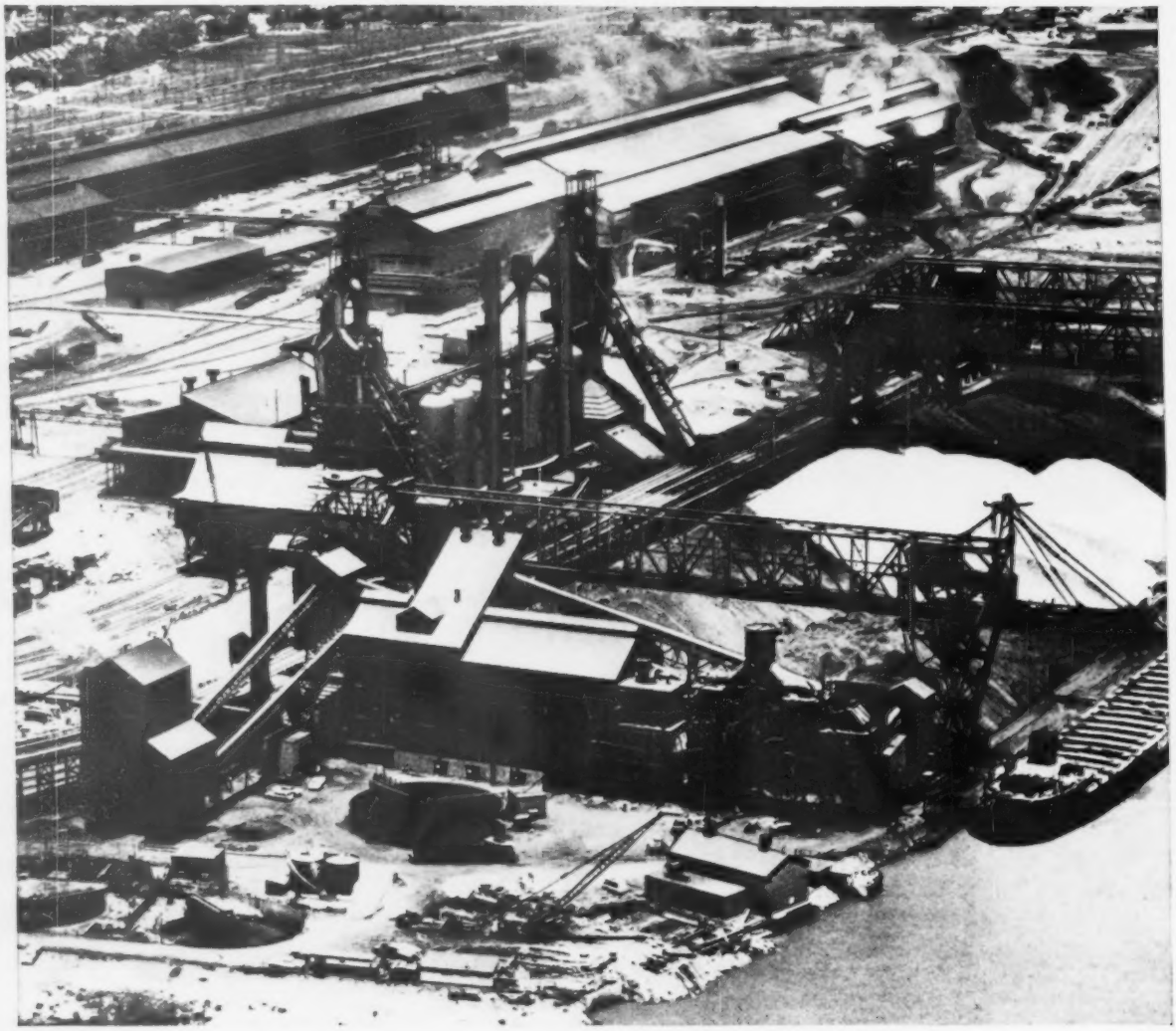
thanks to

Superior

STAINLESS STRIP STEEL

Your fire extinguisher with the stainless body features a very good reason for being ever-ready for service: stainless steel is the *changeless* metal — good as new, year after year, without costly maintenance. • Made of SUPERIOR Stainless Strip Steel, the extinguisher body is easy to draw and weld—always uniform in behavior and performance because of uniformly Superior quality, coil after coil. Let us quote on your stainless requirements.

SUPERIOR STEEL DIVISION
OF
COPPERWELD STEEL COMPANY
CARNEGIE, PENNSYLVANIA
For Export: Copperweld Steel International Company, New York



2100 tpd sinter plant at McLouth Steel

in full production 2 weeks after start-up

Featuring the first Dravo Lurgi straight-line induced draft cooler in United States, McLouth Steel Corporation's new sinter plant at Trenton, Michigan, will produce self-fluxing sinter. The time-span of two weeks from the beginning of pilot operations to full production is believed to have set a record. This plant and a second now under construction will be used primarily for agglomeration of Lake Superior ore fines and reclamation of a five-year accumulation of flue dust.

Each sinter machine is a continuous strand type with 77 eight and a quarter foot wide pallets. Length is 111½ feet with a suction area of about 700 square feet. Speed of the strand may be varied from 6½ feet to 17 feet per minute. Coolers for each machine will handle 2500 tons of sinter per day, and reduce the temperature of sinter so that it can be conveyed on rubber belts.

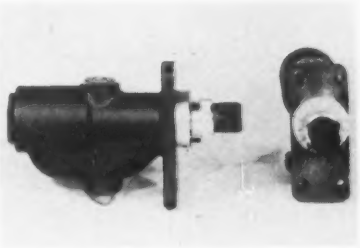
Under an exclusive licensing agreement with Lurgi Company, Dravo designs, manufactures and constructs sinter plants, machines and coolers. Write or phone Dravo Corporation, Pittsburgh 22, Pennsylvania, for information on this or any of the other Dravo products and services for the steel industry.

DRAVO
CORPORATION

Blast furnace blowers • boiler and power plants • bridge sub-structures • cab conditioners • docks and unloaders • dredging • fabricated piping foundations • gantry and floating cranes • gas and oil pumping stations • locks and dams • ore and coal bridges • process equipment • pumphouses and intakes • river sand and gravel • sintering plants • slopes, shafts, tunnels • space heaters • steel grating • towboats, barges, river transportation

New Materials and Components

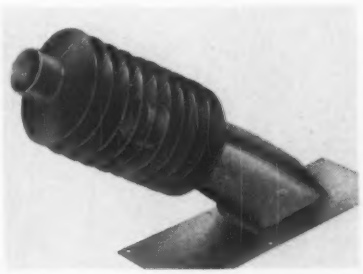
Flow Regulator Controls Very Low Rates of Flow



Controlling flow as low as 35 cc per minute (or 2 cu in. per minute or 0.01 gpm), a flow regulator has a control accuracy of ±10 pct over a pressure differential of 1000 psi. The device has a high-strength, heat-treated, cast-aluminum body with hardened-steel internal parts. A built-in check valve provides free flow with minimum pressure drop in reverse direction. Valve is adjustable between 2-90 cu in. per minute. (Fluid Power Accessories, Inc.)

For more data circle No. 28 on postcard, p. 175

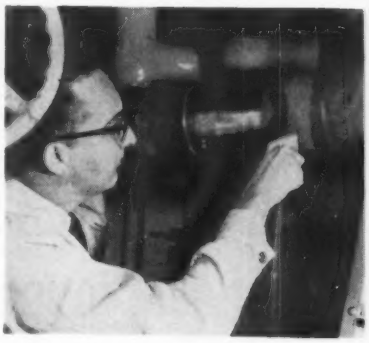
Pliable Parts Withstand Rigid Conditions



Varied combinations of accordion sleeves, boots, covers, and curtains, provide protection for an expanded range of mechanical, hydraulic, and pneumatic applications. Piston rods, rams, and entire drives are fully protected while intricate mechanisms move in horizontal, vertical or angular positions. Fabricated from a neoprene-base material, impervious to oil, grease, and water, the pliable parts withstand a temperature range of —60° to +220°F, without cracking. All shapes, sizes are available. (A & A Mfg. Co.)

For more data circle No. 29 on postcard, p. 175

Plastic Material Cuts Pipe-Repair Costs



Repairing leaky pipes with an epoxy-based paste material reduces time and expense. Workman's overtime, costs of materials and replacement parts, and stoppage of the heating or cooling system are all eliminated with the use of the new material. Application of the material to the pipe can be made while the heating or cooling system functions, provided the fluid pressure can be reduced to eliminate dripping during the repair operation. The plastic material can be mixed with its hardener and prepared right on the job for use in five minutes. It also serves as an effective insulation against condensation. (Ren Plastics, Inc.)

For more data circle No. 30 on postcard, p. 175

Air Cylinders Supply Power in Minimum Space

Used for a wide range of light-duty and "gang-type" air applications, a line of double-acting air cylinders have 1-in. bores and are suitable for air pressures up to 125 psig. The midget cylinders can be neck, angle-leg, or clevis-bolt mounted. The overall length of the smallest cylinder, which has a 1-in. stroke, is 4-19/32 in. The largest of the cylinders, the 12-in. stroke, measures 15-19/32 in. long. Six models are available, each offering a different stroke size. The cylinders can be adapted to perform any push, pull, or reciprocating motion on parts of power presses, press brakes, and all types of doors. Hand, foot, pilot, cam, or solenoid devices can actuate the cylinders. (A. Schrader's Son)

For more data circle No. 31 on postcard, p. 175

THESE BIG TOUGH HOSE ASSEMBLIES SOAK UP THE SHOCK OF A SWING FROM TROPICAL HEAT TO −303°F IN SECONDS

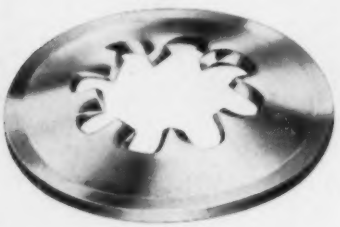
It takes many heavy-duty flexible metal hose connections to feed liquid oxygen to a missile. In the photo above are four 3½" I.D. metal hose lines of stainless steel manufactured by Anaconda Metal Hose. They connect three tank trucks to the pumping station which fuels Jupiters at the Army's Redstone Arsenal. Similar hoses are used to make connections between the fueling masts and the missile itself, making it unnecessary to align piping precisely. As fuel masts are kicked off the missile at firing, the hose must be able to withstand rough treatment and hot exhaust gases, as well as the wide temperature fluctuations.

FREE TECHNICAL SERVICE. Whether you need big, heavy-duty flexible metal connectors for big, tough jobs or small-diameter flexible metal hose for small, tough jobs, Anaconda Metal Hose Division welcomes the opportunity to help you meet your problems of expansion and contraction, movement, vibration, corrosion, pressures, and temperatures. Equipped to work in stainless steel, Monel, and aluminum as well as other alloy steels and copper alloys, Anaconda specialists are constantly working with design engineers on flexible connector assemblies to meet new problems. For further information or engineering assistance, call your Anaconda Metal Hose representative or write: Anaconda Metal Hose Division, The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario. 59131

ANACONDA®
METAL HOSE

Dished Lock Washers

Dished-type lock washers incorporate features that make them useful in applications where locking is a must. Smooth, burr-free flat rims prevent scoring of painted surfaces, plastic parts and die-cast materials.



Spring-takeups compensate for large differentials in expansion between the plastics or die-cast materials and the steel in the screw. (Shakeproof Div., Illinois Tool Works)

For more data circle No. 32 on postcard, p. 175

Magnetic Clutch-Brake

Both clutch and brake are magnetically set in a new clutch-brake combination. When the current is on the clutch magnet and off the brake magnet, the clutch will operate and vice versa. There's also

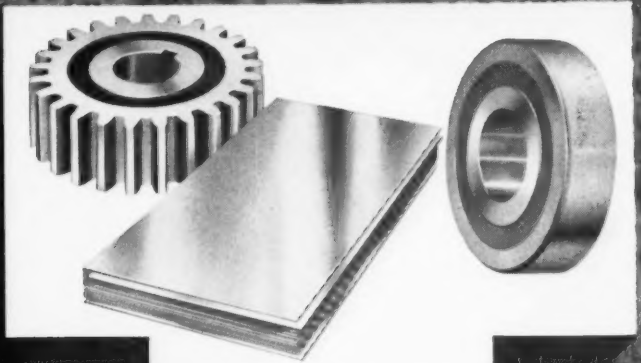
a neutral position when the current is turned off both magnets—in the event free wheeling is required. The units are available in any dc voltages up to and including 90 v. (Stearns Electric Corp.)

For more data circle No. 33 on postcard, p. 175

Speed Control

Rated for dc shunt motors up to 5 hp, and adaptable for dc motors of larger sizes as well, a speed control insures constant speed regardless of the load variation. Power

VALVOLINE
Tectyl
protects metals against RUST



VALVOLINE'S amazing Tectyl rust preventives protect metal surfaces against *rust and corrosion* during storage and shipping.

Low-cost Tectyl compounds are easy to apply by brush, spray or dip and just as easy to remove. They protect metal surfaces against the effects of snow and rain... salt air, humidity, perspiration and corrosive fumes.

Tectyl rust preventives meet exacting government specifications.

Write today for these two helpful Tectyl charts

1. "Valvoline Tectyl U. S. Government Approved Packaging and Preservative Chart." Gives the Army, Navy, Air Force and other Government Agencies' specifications and applications.

2. "Valvoline Tectyl Industrial Rust Preventive Comparison Chart." Specifies applications covering the industrial field.

VALVOLINE Tectyl RUST PREVENTIVES

VALVOLINE OIL COMPANY, Freedom, Pennsylvania
A Division of Ashland Oil & Refining Company

Tension . . . by the ton!

While the air-powered Signode stretcher holds the strapping at its one-ton tension, the workman crimps the seal with a Signode air-powered sealer. The seal, the strap—and the tension—will hold, to keep this 4900-pound bundle of steel bars tight and secure to destination. What material other than steel strapping could do this job, could take and hold this tension, would cost so little, could be applied with air power to do the hard work fast? This hefty bundle is a good example of how—and why—Signode can make your product cost less to handle, store, ship and receive. Write for your free copy of illustrated folder, "Air Power Tensioners and Sealers."

SIGNODE

First in steel strapping

SIGNODE STEEL STRAPPING CO.

2623 N. Western Avenue, Chicago 47, Illinois

Offices Coast to Coast. Foreign Subsidiaries and Distributors World-Wide
In Canada: Canadian Steel Strapping Co., Ltd., Montreal • Toronto

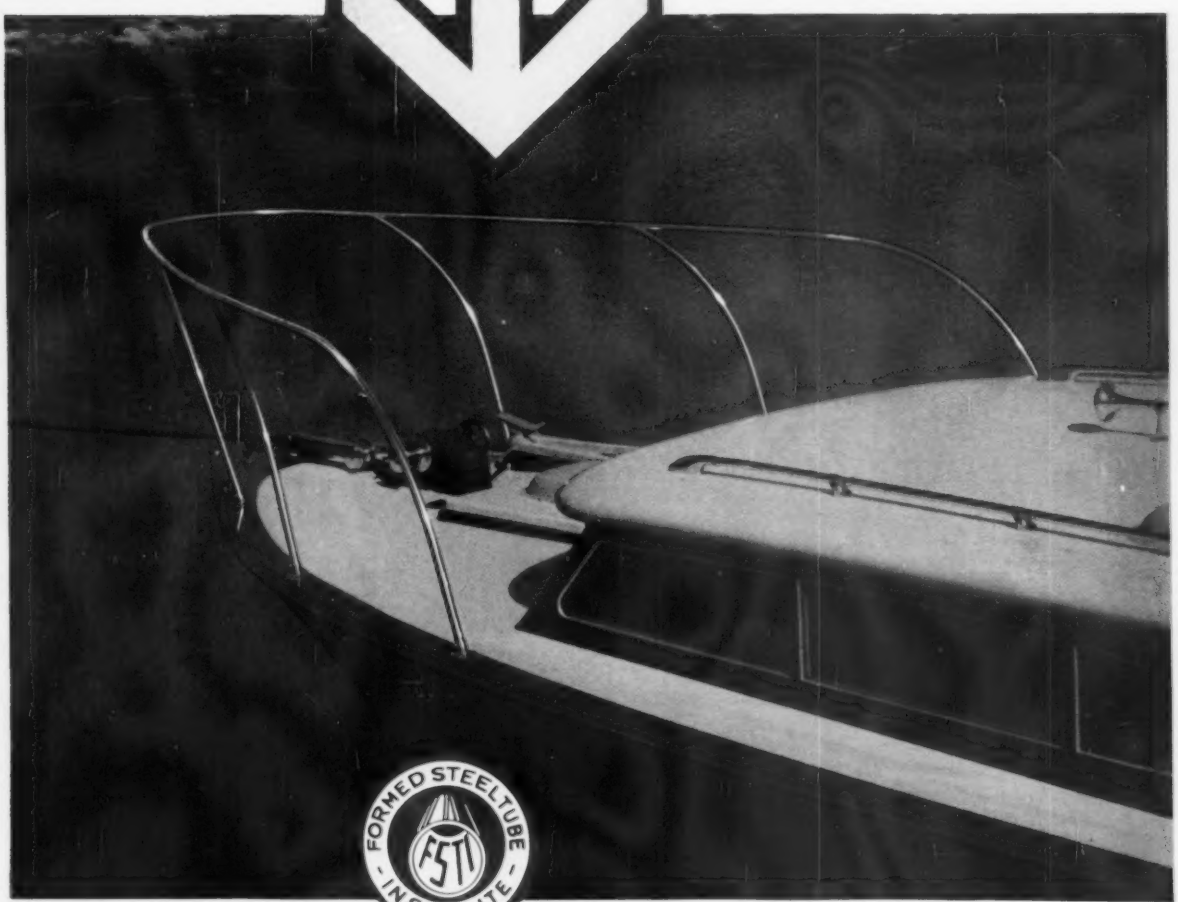
WELDED STAINLESS TUBING SELLS THIS BOAT RAIL PACKAGE

DESIGN WITH *WELDED* TUBING

What's new in welded stainless tubing design? For one—this eye-catching package for pleasure boats.

Out of 1-inch stainless tubing and imagination, gleaming bow rails are now available in pre-cut, preformed package units ready for quick assembly on the decks they'll beautify.

Because welded stainless tubing is practical in price, uniform in dimension and furnished in a range of compositions and tempers, it is a designer's joy to work with. Remember this modern, strong, ever-bright and easy to clean material in your next project —and specify that it be supplied by a quality producer of welded steel tubing! • *Meanwhile, write for detailed Bulletin 8591.* LC-604



FORMED STEEL TUBE INSTITUTE - FSTI

FORMED STEEL TUBE INSTITUTE, INC.

1604 Hanna Building **Cleveland 15, Ohio**

• Armco Steel Corp. • The Babcock & Wilcox Co., Tubular Products Div. • The Carpenter Steel Co., Alloy Tube Div. • Clayton Mark & Co. • Damascus Tube Co. • Jones & Laughlin Steel Corp., Electricweld Tube Div. • National Tube Div., United States Steel Corp. • Ohio Seamless Tube Div. of Copperweld Steel Co. • Republic Steel Corp., Steel and Tubes Div. • Revere Copper and Brass Inc., Rome Manufacturing Company Div. • Sawhill Tubular Products, Inc. • Southeastern Metals Co. • The Standard Tube Co. • Superior Tube Co. • Trent Tube Co., Subs. Crucible Steel Co. of America • Union Steel Corp. • Van Huffel Tube Corp. • Wall Tube & Metal Products Co.

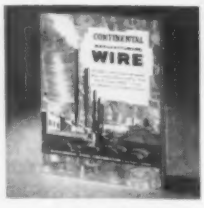
it's Jewel Bright
takes tough twists without
FLAKING, POWDERING, or PEELING

CONTINENTAL®
Brytite®
A PATENTED GALVANIZING PROCESS
CHAIN QUALITY WIRE

The Zinc Coated Wire with the Plated Look
Brytite Wire is so shiny bright and satin smooth that electroplating and special finishing operations are not needed —a valuable saving in labor and materials! The coating is so tight that it withstands severe deformation of the base metal—takes hard turns and twists without flaking, powdering, or peeling.

In Many Sizes, Finishes, Tempers and Analyses
Specify BRYTITE in Satin Finish, Unwiped, or redrawn (in certain sizes) . . . in various tempers and analyses in low carbon and medium low carbon steels . . . for quality weldless or twisted wire chain, or wherever long-lasting brightness is desired. Special shapes, too.

Free Manual of Continental Manufacturers' Wire. Contains details of BRYTITE and other types of Continental Wire. Write for copy.



Fine Finishes in Manufacturers' Wire
CONTINENTAL STEEL
CORPORATION—KOKOMO, INDIANA

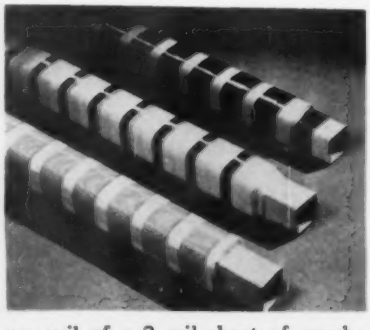
PRODUCERS OF: Manufacturers' Wire in many sizes, tempers and finishes, including Galvanized, KOKOTE, Flame Sealed, Coppered, Tinned, BRYTITE, Annealed, Liquor-Finished, Bright, and Special Shaped Wire. Also Reinforcing and Galvanized Fabric, Nails, Continental Chain Link Fence, and other products.

for the control may be obtained from any ac outlet. The control can be used for any machine tool using a dc motor whose speed must be regulated, such as lathes, shapers, and grinders. The unit contains silicon-controlled rectifiers and magnetic triggers, making motor-speed control smaller, and providing a longer reliable life span than other models. (ACF Electronics Div., ACF Industries)

For more data circle No. 34 on postcard, p. 175

Insulating Parchment

Made of vegetable parchment paper, a new type of insulating material proves useful in dry-type transformer coils. The material provides uniform dielectric strength and good machinability at less cost than other paper materials now being used in this field. The minimum average dielectric strength in volts



per mil of a 2 mil sheet of parchment, or the weakest point of the sheet at which voltage breakdown will occur, is 321 v. One of the advantages claimed for the material is its etched surface which eliminates "telescoping" and loose ends in coil-winding operations occurring to other types of paper. (Paterson Parchment Paper Co.)

For more data circle No. 35 on postcard, p. 175

Filter Systems

Offering important space-saving features, corrosion-resistant and leakproof filter systems filter acid, alkaline and solvent ultrasonic cleaners. The systems produce fine clear filtrates, simply and easily. The centrifugal, all-stainless-steel filter system has a capacity of 50

EIMCO SLAG LOADERS...

. . . keep going where other machines give up!

Whether you specify the Eimco Special Overhead Excavator or the Eimco Steel Mill Front End Loader, you get a crawler-tractor shovel that is precision engineered, rugged-built, to make really tough jobs, such as slag pocket and ground flushing clean-up, economical.

In steel mills throughout the World, Eimco Slag Loaders have proven their ability to outperform and outlast any other machine, thanks to tough, quality construction and advanced engineering features that assure lower operating costs . . . outstanding performance . . . powerful digging and break-out action . . . maneuverability, in open hearth and other tough service areas of steel production.

Let a qualified, experienced Eimco sales-engineer show you specifications and demonstrate the rugged Eimco Special Steel Mill Loaders. For prompt, courteous attention and service, contact the Eimco branch office or dealer nearest you, or write The Eimco Corporation, P.O. Box 300, Salt Lake City 10, Utah, U.S.A.

"ADVANCED ENGINEERING AND QUALITY CRAFTSMANSHIP SINCE 1884"

THE EIMCO CORPORATION

EXPORT OFFICE: 51 - 52 SOUTH STREET, NEW YORK, N. Y.
BRANCHES AND DEALERS IN PRINCIPAL CITIES THROUGHOUT THE WORLD

B - 487

TRACTOR LOADER DIVISION

824 SOUTH 4TH WEST
SALT LAKE CITY, UTAH — U.S.A.

Another H&S Speed Reducer

on a tough job...

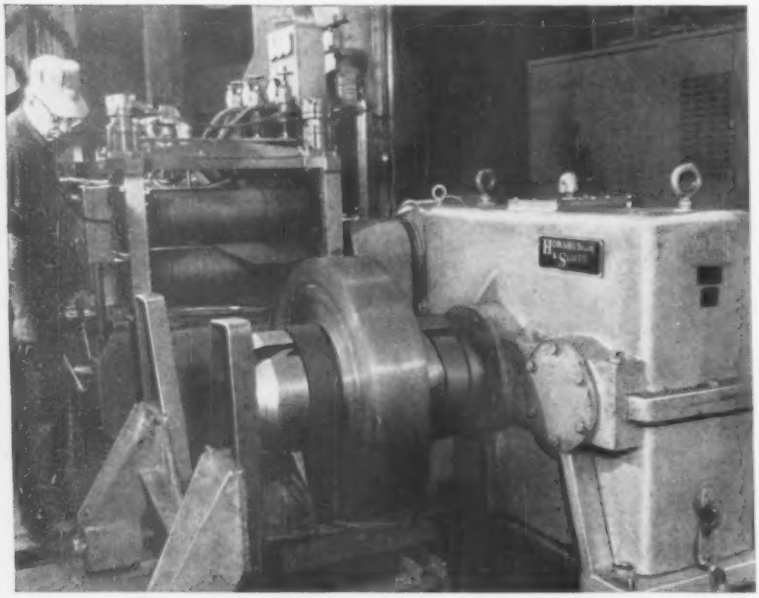
Built rugged for a critical rewind operation, this heavy overhung-load type H & S Herringbone Speed Reducer delivers day-in-day-out service under exacting load conditions.

This standard unit was selected for use on a Bliss precision rewind coiling machine—where strip steel must undergo tension controlled recoiling for subsequent annealing treatment.

Notice the sturdy shaft, with heavy-duty bearings designed to take this heavy overhung load. Observe the rugged housing, made to last.

This built-in toughness typifies H & S construction—on helical, herringbone, worm and combination units.

Send for detailed information on our facilities for producing a complete line of gears and speed reducers in a wide range of sizes and ratings.



Heavily loaded pay-off reel being driven by H & S Speed Reducer in plant of The Acme Steel Company, Chicago.

AGMA

H&S **The HORSBURGH & SCOTT CO.**

5112 Hamilton Avenue • Cleveland 14, Ohio

Specializing in fast production of quality Speed Reducers and Gearing to meet custom requirements.

gph; larger sizes are also available. Furnished with all models are ⅛-hp, 110-v, 60-cycle, 1-phase, totally-enclosed, ball-bearing, continuous-duty motors. (Sethco Mfg. Corp.)

For more data circle No. 36 on postcard, p. 175

Fuse Tubes

Thick-walled, paper-base tubing is available for electrical applications such as fuse tubes and lightning arrester barriers, in which high-strength, good electrical properties, freedom from cracking, and resistance to moisture are necessary. This tubing is readily machined with conventional equipment: It can be tapped or threaded with as many as 28 threads per inch. The new material conforms to performance requirements specified for molding tubing of NEMA grade XXX and Mil-P-79B type PBE. Moisture absorption is less than one pct. Compressive strength is 21,000 psi. Tensile strength is 12,000 psi. Short-time dielectric strength is 500 v per mil and dissipation factor is 0.045 at one megacycle. (Westinghouse Electric Corp.)

For more data circle No. 37 on postcard, p. 175

Experience—*the added alloy in* **Allegheny Stainless**

form
Stainless steels can be bent, drawn, and roll-formed by all the standard techniques known in the metalworking industry. In these operations, stainless requires somewhat greater power and harder tools than it takes to work softer materials. But this characteristic stems directly from stainless steel's superior ability to withstand bending and denting in service.
This attractive stainless cocktail set was produced by flow-turning—one of the newer metalworking techniques that have been developed to offer new answers to many design problems. With these improved fabricating techniques, components that formerly called for two or more materials can often be made better or more economically from one solid material that fills all the requirements of design. The techniques of spinning and abrasive wheel polishing offer special design possibilities, as exemplified by the spun dish on page 7. For further information on the degree of forming possible with a specific type of stainless, contact your nearest A-L office.
Stainless Cocktail Set
Stainless Auto Heater

Sample pages from A-L's new free booklet on design

"Design and Allegheny Stainless" is illustrated page after page with hand-picked examples of good design in the gleaming metal.

Twenty-four photographs and drawings in full color, twenty-six in dual color and black and white become a showcase of the versatility of stainless.

The examples are presented with text in terms of Function, Shape, Texture and Color. They cover many fields from automotive parts to holloware for the home . . . to open new horizons for the designer.

There is a working outline of types and properties in the many grades of Allegheny Stainless. Some of the new textures illustrated will interest the designer looking for new effects.

Write for your copy of "Design in Allegheny Stainless Steel"—without cost or obligation. *Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa. Address Dept. A-3.*

Packed with actual examples of good design—and ideas for future applications

ALLEGHENY LUDLUM

Export distribution: AIRCO INTERNATIONAL

EVERY FORM OF STAINLESS . . . EVERY HELP IN USING IT

AL

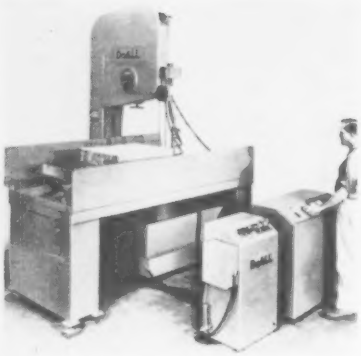
084

New Equipment and Machinery

Molding Press Features Low Operating Cost

The equivalent of four machines in one, a 25-ton, air-operated automatic molding press finds use on short production runs where low mold costs and quick setup are desired. The press converts easily from automatic transfer molding to automatic compression molding; it can operate on either a fully-automatic or semi-automatic basis. The small size of the press makes it economical for molding extremely small parts in small molds on an automatic basis. Normal shop air supply (with a working pressure of 100 psi) is ample for press operation. The unit has a 5½-ton transfer force and can take molds up to 11 x 16 in., yet requires a floor space of only 29 x 36 in. (F. J. Stokes Corp.)

For more data circle No. 38 on postcard, p. 175



Band Machines Slice Fragile Cellular Foil

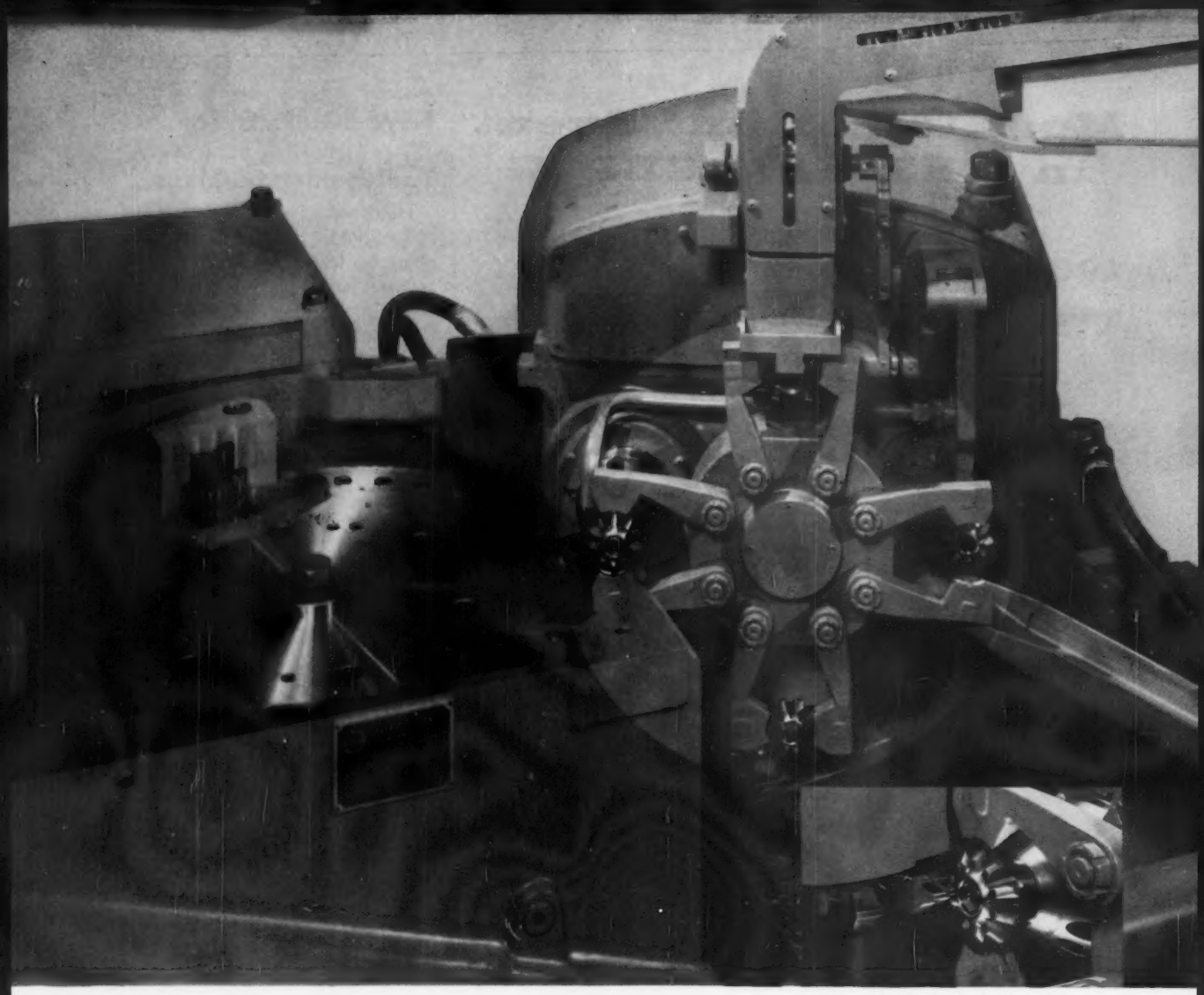
Utilizing an electrical machining process known as quenched-arc cutting, a line of band machines slices honeycomb of aluminum, stainless steel or titanium. The units offer the band-machining advantages of high-speed cutting and low material waste. Each machine consists of a fixed-speed band machine, power supply and recirculating coolant system. The controls are simple and are mounted on the side of the machine column. The power supplies for these machines range from 5 kw up, and all have a voltage range of 6 to 24 v dc. An ammeter and voltmeter on the column permit accurate monitoring throughout the sawing operation. Use of the coolant prevents metallurgical changes. (The DoALL Co.)

For more data circle No. 39 on postcard, p. 175

Machine Evaluates Metal-Finishing Qualities

A finishing-process testing machine enables manufacturers of buffs, compounds, and base metals, and metalworking finishing plants and departments to study and evaluate finishing-process variables. The testing machine consists of a cabinet base that houses the mechanism for moving sample materials, and an adjustable lathe on which the buffing wheel is mounted. Exhaust fans at each side of the rear of the base cabinet keep the finishing area of the machine free of buffing dust. The machine can have the following conditions varied for tests: sample feed, buffing pressure and buffing-wheel speed. The unit occupies a floor space about 10 x 5 ft, and is about 7-ft high overall. (Acme Mfg. Co.)

For more data circle No. 40 on postcard, p. 175



In Revacycle Method each blade of cutter is longer than its predecessor; there is no depthwise feed of cutter itself. One rotation of the cutter completes each tooth from the solid.

Fastest way yet to cut straight bevel gears

If you're looking for a faster, fully automatic way to cut straight bevel gears and pinions with conjugate surfaces and localized tooth bearings, consider the Gleason No. 109 Straight Bevel Revacycle® Machine.

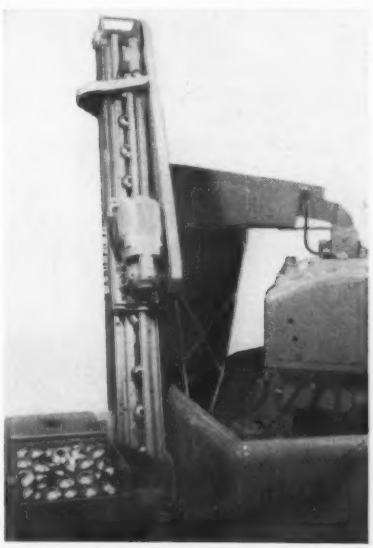
You rough, semifinish, and finish a gear from the solid blank with a single rotation of the Revacycle cutter.

Now both 21″ and 25″ diameter cutters can be used on the No. 109 Revacycle Machine. The 25″ cutter cuts gears to a maximum depth of 0.600″. The 21″ cutter will cut to a maximum of 0.400″.

A new, completely automatic mechanism loads and unloads each gear. You can feed this loader manually or with a conventional belt conveyer.

The No. 109 Machine handles a wide range of automotive and farm machinery gears: up to 10″ diameter, 5:1 ratio, 1¼″ face width.

Send for our bulletin for information on both the machine and the Revacycle Method.



Storage unit and flight conveyer can be fed manually or with belt conveyer. Even with manual operation, one operator can handle a battery of machines.

GLEASON WORKS

76

1000 UNIVERSITY AVE., ROCHESTER 3, N.Y.

Most Important Event in METALWORKING

1960 ASTE TOOL SHOW and CONFERENCE

530 exhibitors will be on hand to show and demonstrate more than 6,000 products . . . machine tools and attachments, precision control and inspection equipment, automation devices, cutting tools, dies, jigs and fixtures . . . everything, in fact, that's *new* in tools and tooling. It's your best opportunity to see, study, compare . . . under one roof, at one time . . . the most modern, scientific methods, processes and tools in metalworking.

Equally important, the Tool Engineering Conference, with its 36 technical sessions, 70 outstanding papers, offers you an opportunity to learn about and discuss the latest technical advances and developments in the science of tool engineering.

There'll be plant tours, too . . . a chance to see and study, in actual operation, product and process methods in the world's major center of high-volume production.

All of these scientific and educational attractions, and more, will bring more than 35,000 metalworking management, engineering and production men to the 1960 ASTE TOOL SHOW. Make sure you're one of them! Write or wire immediately for your rapid registration forms.

APRIL 21ST-28TH

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AMERICAN SOCIETY OF TOOL ENGINEERS

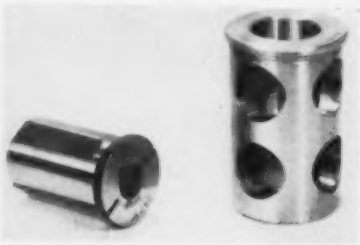
10700 PURITAN AVENUE
DETROIT 38, MICHIGAN

THE AMERICAN SOCIETY * '60 OF TOOL ENGINEERS

NEW EQUIPMENT

Tool-Holder Bushings

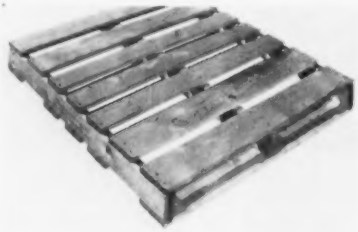
Hardened and ground, a new line of tool-holder bushings adapts cutting tools to turrets and tool slides of turret lathes and automatics. The bushings come in split and solid types, in bore sizes for all common uses. They hold their shape and accuracy even under severe punishment in the shop. Raised shoulders make them easy to insert and remove. Split bushings come in bore sizes from ⅛ to 3 in. The OD range is from ¾ to 3½ in., and lengths from 1¾ to 5¼ in. Solid bushings come in similar sizes. (Gahr Machine Co.)



For more data circle No. 41 on postcard, p. 175

Warehouse Pallets

Reinforced with a specially made ¾ x 0.035-in. plastic-coated steel strapping, new wooden warehouse pallets last more than twice as long as standard pallets. The new pallet features two- and four-way entry, elimination of snagging, and simple construction. (Signode Steel Strapping Co.)



For more data circle No. 42 on postcard, p. 175

Rammers

Designed to cut foundry costs, a line of floor-type rammers improves quality of work and speeds up overall operations. The air-powered sand-wiper rammers have a specially-designed front seal of neoprene-

Supreme

in cutting high temperature alloys,
ultra high strength alloys, special and rare metals

broaching
milling
hobbing
turning
drilling
planing

VascoJet 1000 (Br 350, 400, 500,)
A-286
S816
Udimet 600
Udimet 700
M-252
19-9 DL
AISI/SAE 4140 (Rc 41-43)
Discaloy
Waspaloy
Nimonic 80
Zirconium
Titanium Alloys

Pure Molybdenum
A-286 (Solution Treated Br 312)
410 (Rc 45)
Zircaloy #1
Zircaloy #2
AISI/SAE 4342 (Rc 47)
AISI 8660 (Rc 45-50)
AISI/SAE 1050 (Rc 47-59)

VASCO SUPREME®

Vasco Supreme is being used successfully for machining the special metals and alloys here listed*—often when other cutting tool materials, including carbides, have failed. • In addition, of course, Vasco Supreme delivers outstanding performance throughout industry in machining heat-treated steels of standard compositions, and hard and abrasive materials such as cast iron, cast steel, aluminum and plastics, etc. • Whatever the areas of your difficult cutting assignments, specify unique Vasco Supreme for performance surpassing by many times that of any other high speed steel. Let us counsel you on latest applications techniques.

*All applications are supported by successful performance reports on file.

302
HS 25 (Solution treated to Br 207)
Nichrome 526
Inconel 901
Inconel 700
Udimet 500
R 235
All solution treated high temperature alloys
AM 350 (Solution Treated and aged to Rc 47)
AISI/SAE 4340 (Rc 44-55)
Refractaloy

1910-1960

FIRST QUALITY TOOL & SPECIAL STEELS V·A

Our 50th Anniversary

Vanadium-Alloys Steel Company
LATROBE, PENNSYLVANIA

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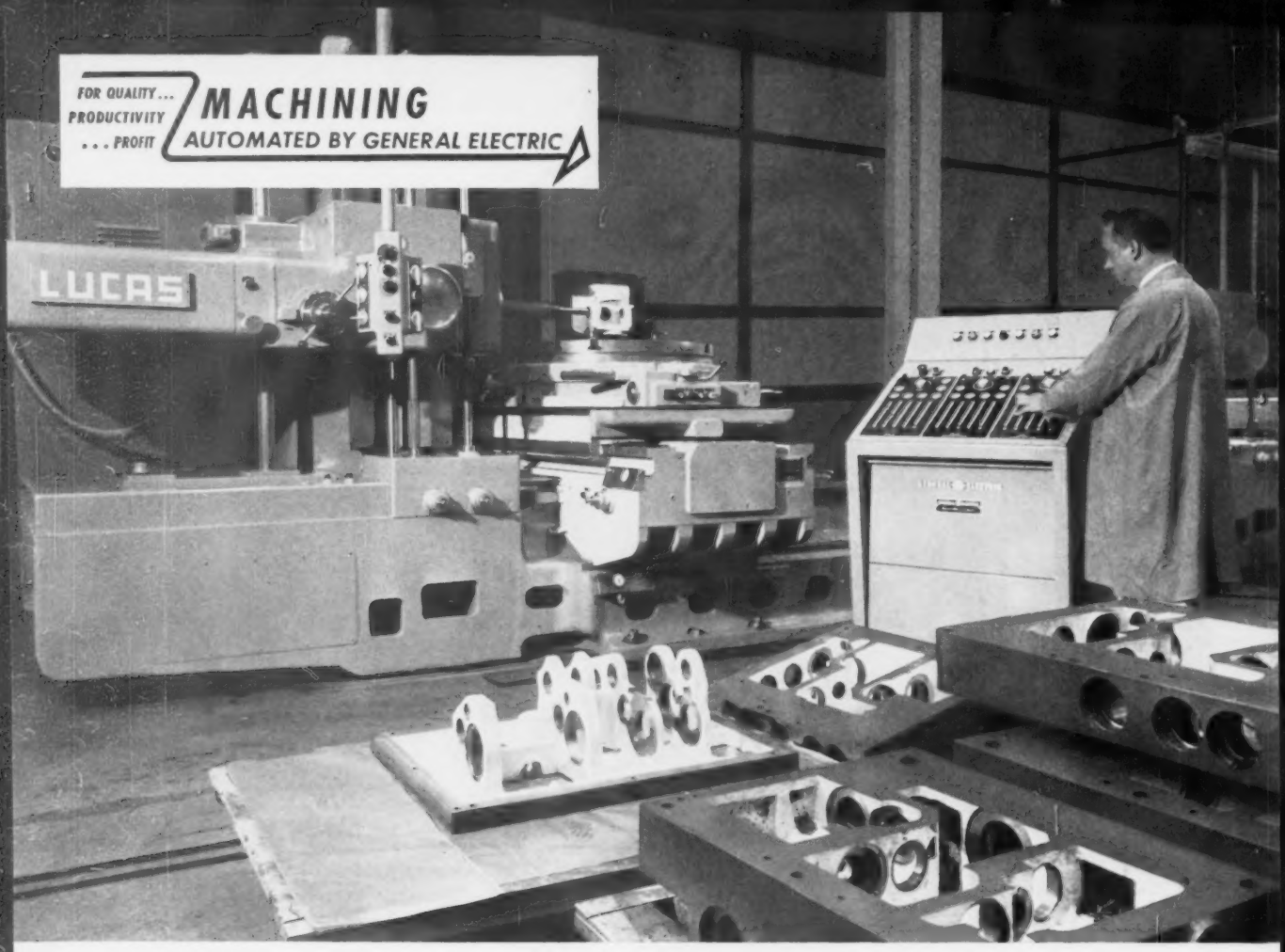
FOR QUALITY... PRODUCTIVITY ...PROFIT

MACHINING
AUTOMATED BY GENERAL ELECTRIC



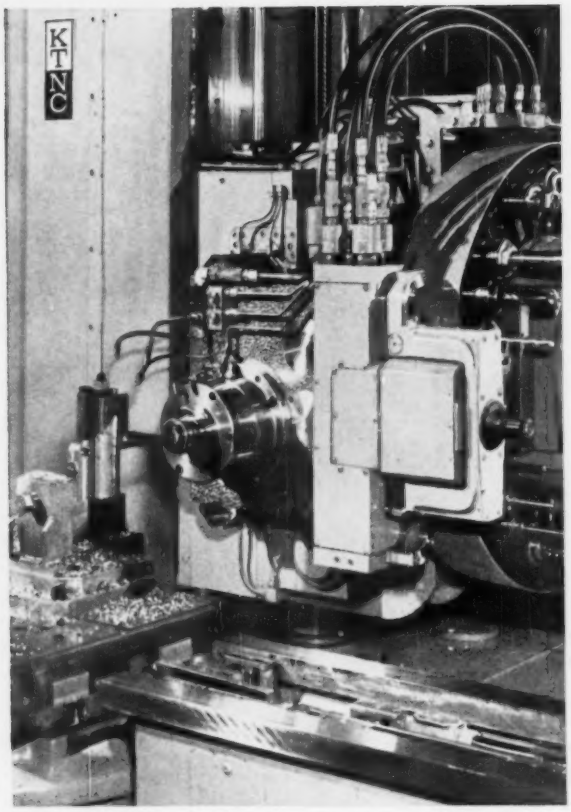
INCREASE MACHINE UTILIZATION

MARK SERIES NUMERICAL CONTROLS..... standard, job-proved packages now in use on a wide variety of machines

General Electric's Mark series of standard, pre-engineered numerical control packages—with systems for controlling 1 to 5 motions plus machine auxiliary functions — are compiling impressive performance records on scores of machines throughout American industry today.

Machine operation is completely automatic—from punched tape prepared on a standard automatic typewriter. If desired, semi-automatic positioning, useful for prototype work, is obtained with manually set dials on the control station.

Key components of a typical Mark package are a controller, a punched tape reader, operator's control station, servo drives and position-sensing units.



ONLY ONE SETUP NEEDED to produce even highly complex parts on this G-E controlled multi-purpose milling, boring and drilling machine means dramatic savings. And, tooling savings on one group of 6 parts totaled $10,000.

83% LEAD-TIME REDUCTION is average for parts produced on this 6-spindle turret drill directed by G-E numerical control. Tooling costs are 40% of former methods. Tape data-storage saves expensive tooling space.

with General Electric numerical control

Move quickly from part to part, cut non-productive machine time

An idle machine . . . and an investment going to waste! This is the case in plants throughout metalworking today—perhaps including yours!

Many reasons are apparent: tool-room lag in making fixtures; long setups during changeover; excessive manual positioning; or, poor machine scheduling due to manual operation. Whatever the case, this adds up to something you cannot afford: high unit costs.

But, there is a solution! General Electric numerical control on today's modern machines provides increased machine utilization that signals the end of long lead times . . . multiple setups . . . long machining cycles . . . and, excessive in-process inventories.

Reports prove the advantages of G-E numerical controls. One user states that with G-E controls, his milling, boring and drilling machine is making chips 55% more of the time . . . setup time is cut 40% . . . and positioning time is 50% less. All this—plus a major reduction in parts inventories made possible by G-E tape control's ability to exactly reproduce a part at any future time—enabled this user to pay for his numerically controlled machine in less than two years.

In another case, a new multi-purpose milling machine—directed by G-E numerical control—selects 31 different tools automatically. Non-productive machine-cycle time is virtually eliminated, and complete part machining is possible on a *single* setup. On one small-lot part, 749 hours were saved. Tooling savings on a group of 6 different parts totaled over $10,000.

Join with these and hundreds of users who are increasing machine utilization and worker productivity, and eliminating special tooling cost with G-E numerical control. See your G-E Apparatus Sales Engineer or machinery builder today. General Electric Co., Specialty Control Dept., Waynesboro, Va. 795-8

Progress Is Our Most Important Product

GENERAL ELECTRIC

For Quality and Economy Use

MALLEABLE

For Service Contact..

CONNECTICUT
Connecticut Mall. Castings Co., New Haven 6
Eastern Malleable Iron Co., Naugatuck
New Haven Malleable Iron Co., New Haven 4

DELAWARE
Eastern Malleable Iron Co., Wilmington 99

ILLINOIS
Central Fdry. Div., Gen. Motors, Danville
Chicago Malleable Castings Co., Chicago 43
Moline Malleable Iron Co., St. Charles
National Mall. and Steel Castings Co., Cicero 50
Peoria Malleable Castings Co., Peoria 1
Wagner Castings Company, Decatur

INDIANA
Albion Malleable Iron Company, Muncie Division, Muncie
Link-Belt Company, Indianapolis 6
National Mall. & Steel Castings Co., Indianapolis 22

IOWA
Iowa Malleable Iron Co., Fairfield

MASSACHUSETTS
Belcher Malleable Iron Co., Easton

MICHIGAN
Albion Malleable Iron Co., Albion
Auto Specialties Mfg. Co., Saint Joseph
Cadillac Malleable Iron Co., Cadillac
Central Fdry. Div., Gen. Motors, Saginaw

MINNESOTA
Northern Malleable Iron Co., St. Paul 6

MISSISSIPPI
Mississippi Malleable Iron Co., Meridian

NEW HAMPSHIRE
Laconia Malleable Iron Co., Laconia

NEW YORK
Acme Steel & Mall. Iron Works, Buffalo 7
Frazer & Jones Company Division, Eastern Malleable Iron Co., Solvay
Oriskany Malleable Iron Co., Inc., Oriskany
Westmoreland Mall. Iron Co., Westmoreland

OHIO
American Malleable Castings Co., Marion
Central Fdry. Div., Gen. Motors, Defiance
Dayton Mall. Iron Co., Ironton Div., Ironton
Dayton Mall. Iron Co., Ohio Mall. Div., Columbus 16
Maumee Malleable Castings Co., Toledo 5
National Mall. and Steel Castings Co., Cleveland 6

PENNSYLVANIA
Buck Iron Company, Inc., Philadelphia 22
Erie Malleable Iron Co., Erie
Lancaster Malleable Castings Co., Lancaster
Lehigh Foundries Company, Easton
Meadville Malleable Iron Co., Meadville
Pennsylvania Malleable Iron Corp., Lancaster

TEXAS
Texas Foundries, Inc., Lufkin

WEST VIRGINIA
West Virginia Mall. Iron Co., Point Pleasant

WISCONSIN
Belle City Malleable Iron Co., Racine
Chain Belt Company, Milwaukee 1
Federal Malleable Company, Inc., West Allis 14
Kirsh Foundry Inc., Beaver Dam
Lakeside Malleable Castings Co., Racine
Milwaukee Malleable & Grey Iron Works, Milwaukee 46

These companies are members of the Malleable Castings Council

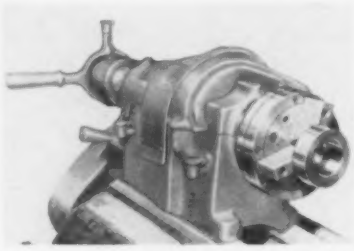
NEW EQUIPMENT

felt that wipes the surface of the chrome plated piston rod completely clean. This prevents the entrance of any abrasive material into the bore of the guide. Use of the rammers gives: a consistently uniform blow that increases mold hardness faster; twice as many blows per minute with the same amount of air consumption, and a better quality mold with less ramming at increased speeds. Weights of the rammers range from 18 to 47⅛ lb. Barrel bores are 1-5/16, 1⅝, and 2 in. (Ingersoll-Rand Co.)

For more data circle No. 43 on postcard, p. 175

Precision Chuck

For use on high-speed precision lathes, boring machines, and grinders, a chuck has blank top jaws which are designed to be bored out to fit the workpiece. It is accurate to less than 0.0005 in. and will hold work up to 3½-in. diam on the OD or ID. The chuck has a ¾-in. hole through it, thus permitting coolant to be piped through the spindle. The chuck can be operated either by an air cylinder or by a lever-type collet closer. The face of the chuck extends only 1⅜-in. beyond the end of the spindle. The chuck weighs only 8½ lb. (Power-Grip, Inc.)



For more data circle No. 44 on postcard, p. 175

Stud Driver

Weighing less than 6¾ lb, a powder-actuated stud driver anchors wood or metal to concrete or steel. The driver can set as many as six special alloy steel fasteners in one minute, using ¼-in. drivestuds in lengths from 1 to 6 in., either threaded or headed. Eye pins for fastening to concrete are also available. The stud driver is 14 in. long, uses only ¼-in. drivestuds, and has a powder charge of 0.25 caliber. It automatically ejects spent cartridge cases. A companion model uses interchangeable ¼- and ⅜-in. barrels, with 0.22 or 0.25 caliber powder charges. It has a removable breech plug instead of the automatic cartridge ejector. (Gregory Industries, Inc.)

For more data circle No. 45 on postcard, p. 175

Resin-Coated Sand

For shell cores and molds, a fast curing, resin-coated sand effects increases in rates of mold and core production of up to 50 pct. Every batch of the sand is tested to insure meeting specifications for melt point, tensile strength, and rate of shell formation. (Aurora Metal Co.)

For more data circle No. 46 on postcard, p. 175

Rolling Machine

Designed for the rapid forming of rings, a horizontal all-steel section rolling machine has a power-operated adjustable roller. Removable panels enclose the drive units, and the twin main-driving rollers are contained in a sturdy steel housing. The third adjustable pressure roller

Illustration of Malleable casting being turned at 1,400 surface feet per minute with a 0.100" depth of cut using an oxide tool.

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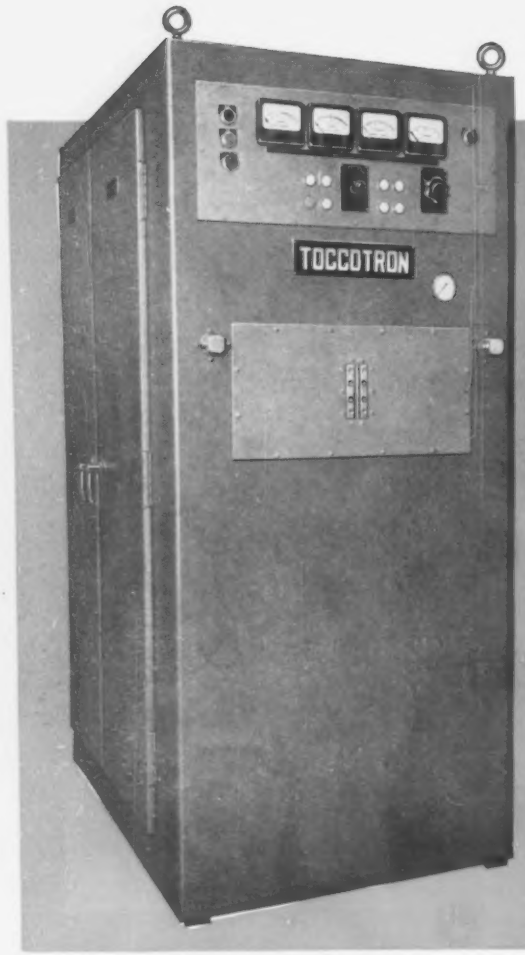
For detailed information on "Machinability of Malleable Castings", contact any of the progressive companies listed on the opposite page, or Malleable Castings Council, Union Commerce Building, Cleveland 14, Ohio.



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15 kw, 450,000 c.p.s. TOCCOtron unit. Note double doors for easy accessibility to interior components—an advantage common to all TOCCOtron units. All TOCCO equipment is certified to comply with the rules and regulations of the Federal Communications Commission.

Check these advantages:

- ☐ The industrial heavy-gauge steel cabinet which completely encloses all high potential circuits preventing radiation interference and personnel hazards.
- ☐ Meters in all sensitive circuits to enable the user to obtain the maximum output and efficiency.
- ☐ High KVA tank circuits and adjustable plate voltage, grid bias and grid drive controls where desirable, allow easy matching to all loads.
- ☐ Externally mounted circuit breaker and disconnect located so that it is easily accessible. JIC type enclosure which separates all control components from the high voltage circuits.
- ☐ Integral water systems available in most models—saves floor space and water consumption.
- ☐ Gasketed, lockable doors allow easy accessibility to all components. JIC type enclosure cooled with air to water heat exchanger.

Because TOCCO makes both audio frequency equipment (motor-generator sets) and radio frequency equipment (electronic tube-type units as shown), you can always count on a completely unbiased equipment recommendation—the right equipment for your particular heating job.

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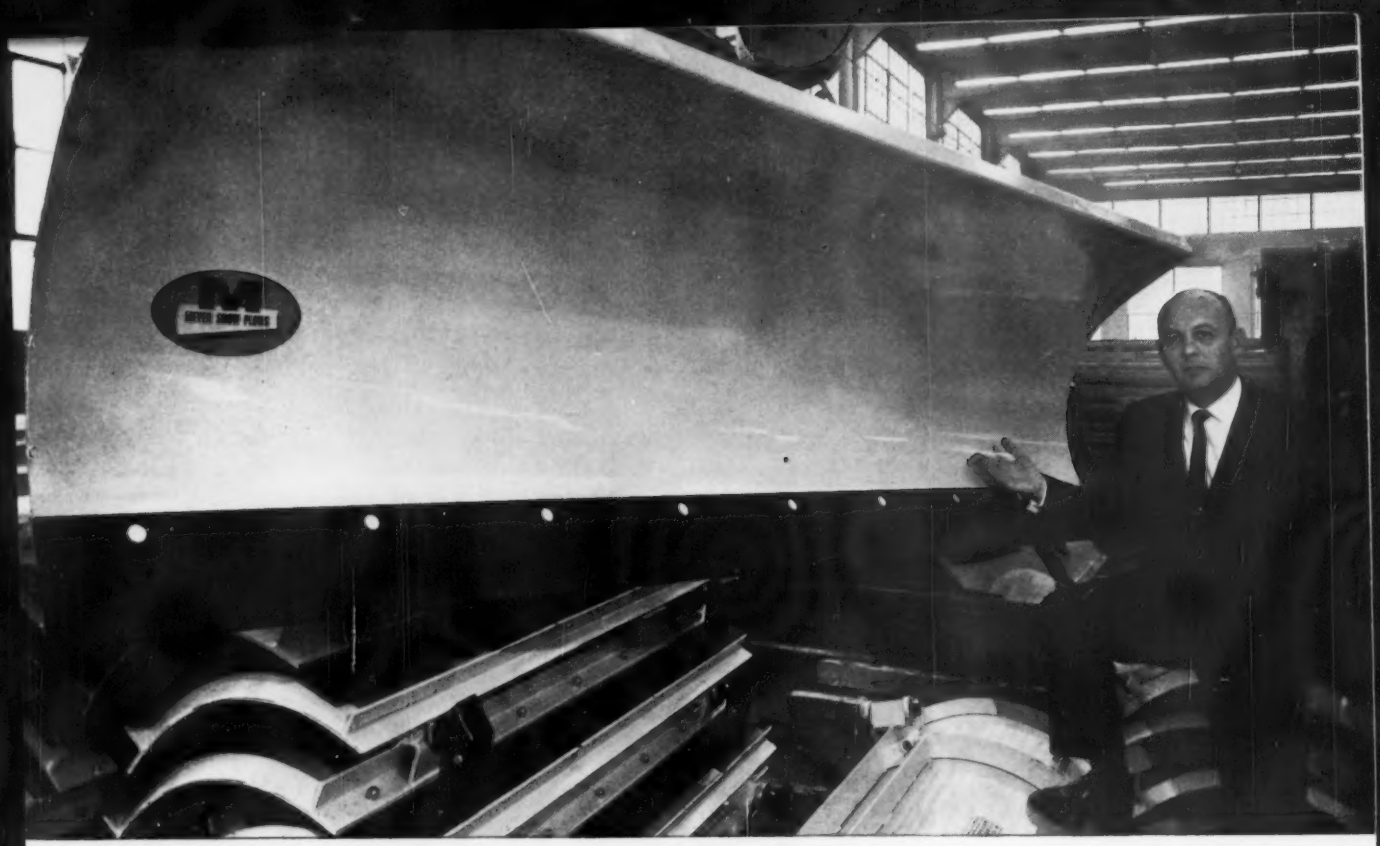

"Timely deliveries from U.S. Steel Supply help keep us on schedule," *says Mr. Tom Meyer,*

Vice-President and General Manager, Meyer Products, Inc., Cleveland, Ohio
Manufacturers of quality snow plows and angle-dozers for jeeps, trucks, tractors, etc.

"Whenever we're faced with a production bottleneck because we're running out of COR-TEN steel or other material," says Mr. Meyer—"we pick up the phone and call U. S. Steel Supply. In a matter of hours, and sometimes minutes, the material is on its way to our plant.

"Time after time, U. S. Steel Supply has helped keep our production line on schedule with overnight service of urgently needed materials. U. S. Steel Supply has also shown us how to free more plant space for production facilities. Instead of carrying a huge in-plant inventory, we order only the material we need . . . when we need it."

If material shortages are causing you to fall behind your production timetable, call your nearest U. S. Steel Supply Steel Service Center. You'll find us in the Yellow Pages listed under *Steel*.

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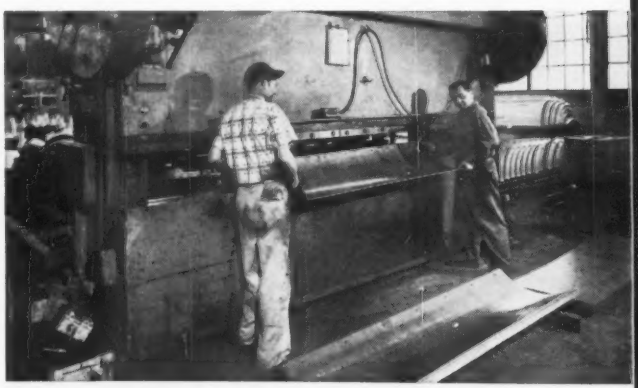

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USS

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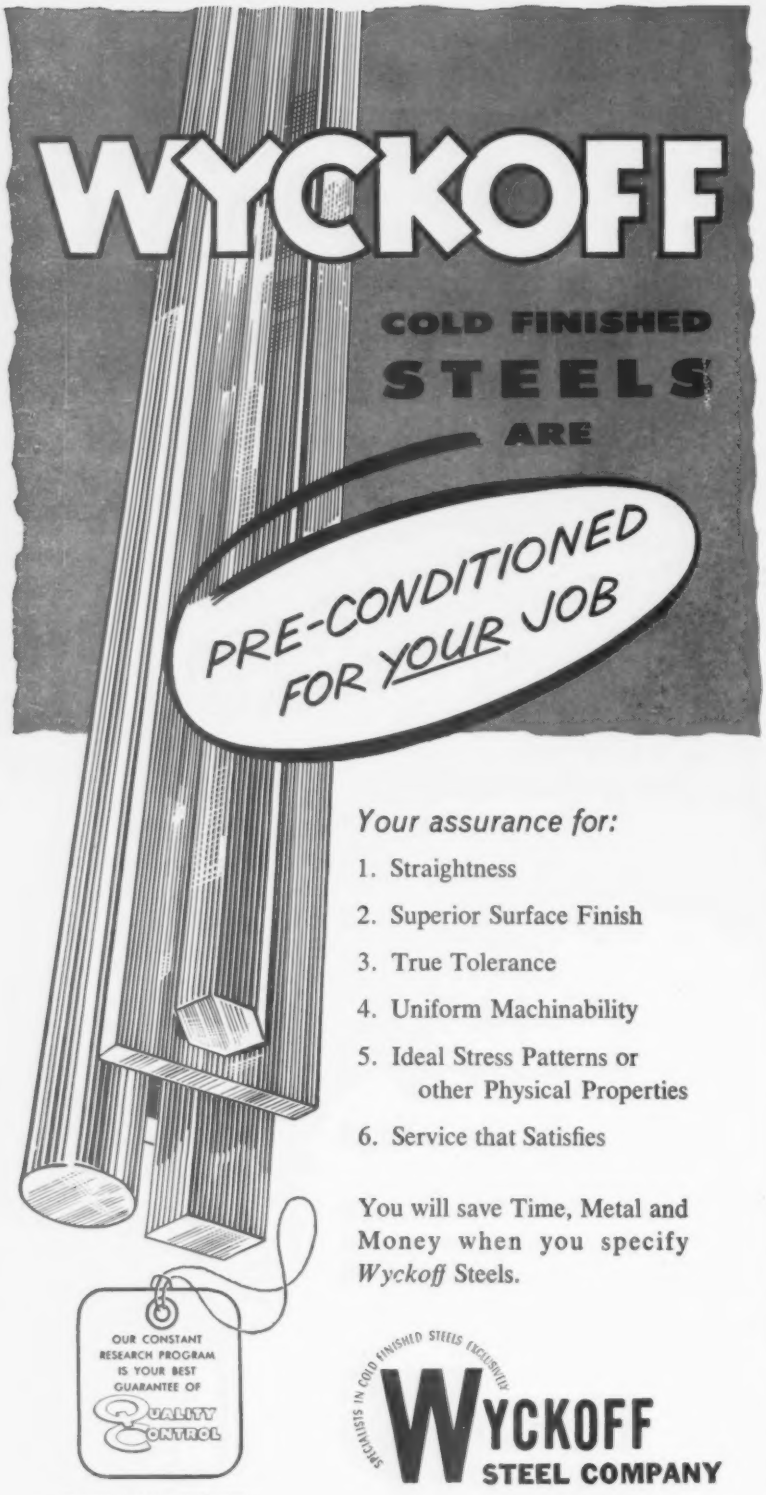

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is mounted on a heavy steel slide in taper roller bearings, so as to allow free rotation under the heaviest loads. A central panel contains the controls for the roller motor and the main-driving motor. The electrical equipment is suitable for 400/440-v, 3-phase, 50-cycle supply. (F. J. Edwards Ltd.)

For more data circle No. 47 on postcard, p. 175

Tractor Shovel

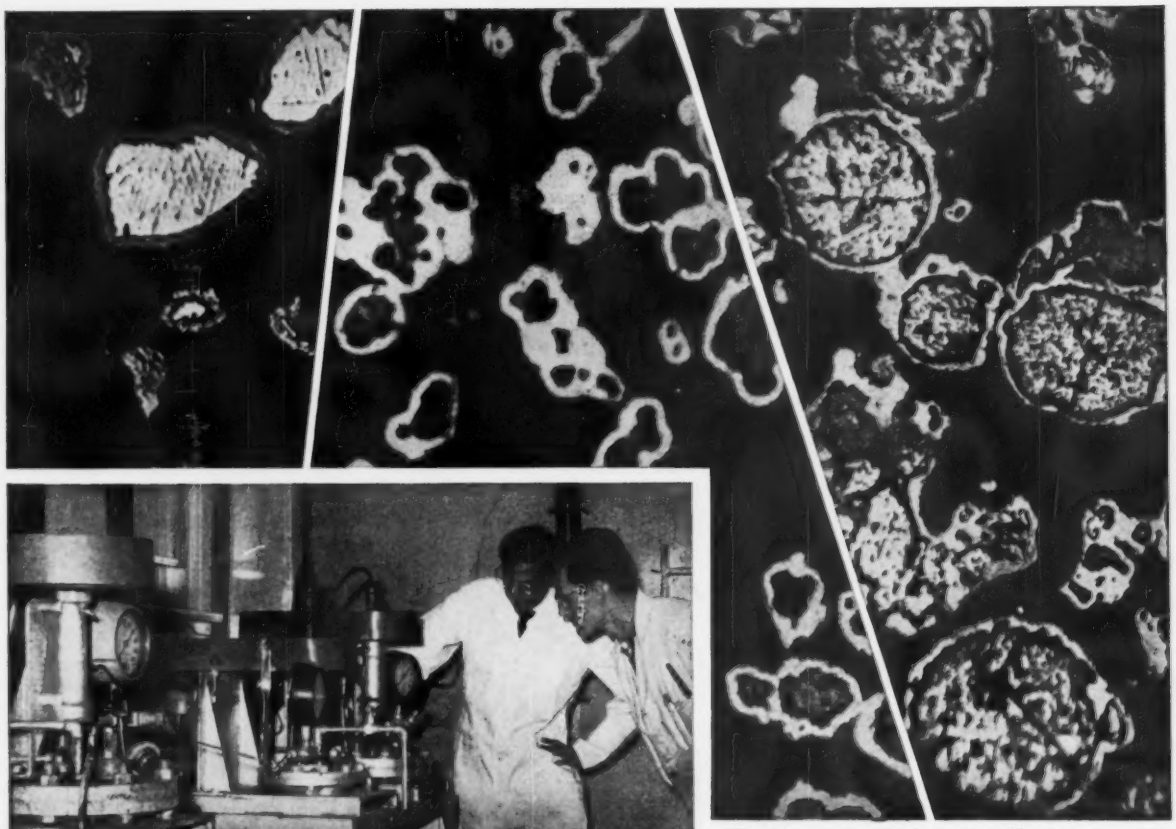
Having an operating capacity of 3000 lb, a new tractor shovel comes equipped with a 1 cu yd bucket. The four-wheel-drive features full power-shift transmission with matched torque converter. With three speed ranges in each direction, all shifts can be made "on the go" with no need to stop for "range"

shifts. A 77½-hp heavy-duty gas engine powers the machine. There is a clearance of 8 ft 4 in. under the cutting edge, with bucket in dumped position, and a 29-in. dumping reach ahead of the front tires. Another feature of the machine is four-wheel hydraulic brakes. (The Frank G. Hough Co.)

For more data circle No. 48 on postcard, p. 175

Metal Resurfacing

Available either as a stick or in a pressure-spray can, a universal-type lubricant quickly resurfaces dies and other surfaces that have been damaged by metal pickup or galling. The lubricant deposits a film of hard, smooth mono-molecular metal. This film, under the heat of friction, becomes a part of any metal surface to which it is applied. It resists high temperatures, acids, alkalis and corrosion, and will not rub off or transfer to other



The photomicrographs shown above illustrate a few of the many coated metal powder combinations made possible by Sherritt's patented coating process: (left to right) nickel on chromium, copper on nickel, and nickel on iron.

new techniques for solid state nickel alloying

New metal coating techniques developed by the Sherritt Research Staff have greatly advanced the art of solid state alloying in powder metallurgy. These patented techniques permit controlled coating of minute metal or non-metal powders with pure nickel or cobalt.

By these new techniques metal powders sensitive to oxygen contamination while in process can now be protected by a continuous coating of nickel. The coating is intimately bonded over the entire particle surface so that compacts can be produced from a completely "nickel-plated" metal powder.

Perhaps the most significant contribution of the Sherritt developments to the art of powder metallurgy is the production of the metal/non-metal combination powders. With control of the coating completely in the hands of the metallurgist, the number of possible metal/non-metal combination powders suitable for compacting applications becomes almost unlimited.

SHERRITT

FOOTE MINERAL COMPANY is the exclusive sales agent for Sherritt nickel and cobalt in the United States and Canada. For product literature, prices, and delivery information, contact the Foote Mineral Company, 438S Eighteen West Chelten Building, Philadelphia 44, Pennsylvania.

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As a result of this complete, professional service you will find many of the finest names in industry among LAMSON installations. During the past 75 years LAMSON has been active in almost every field, yours included, and perhaps even in divisions of your own firm. LAMSON can cut costs; speed production; increase your profits.

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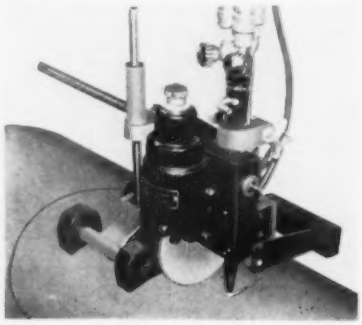
metal surfaces. The lubricant also finds use as a mold release, and as a lubricant for chains, sprockets, ways, and other hard-to-reach moving parts. (Chemical Lubricants Co.)

For more data circle No. 49 on postcard, p. 175

Hand Cutter

Designed primarily for cutting round openings in tanks and large-diameter pipes, a mechanized hand cutter also makes straight, irregular or circular cuts in flat plate with equal speed and accuracy. A magnetic radius rod permits center

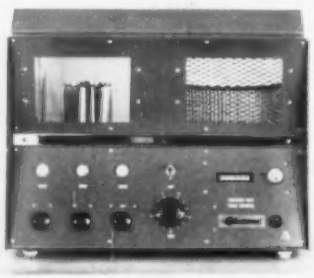


fulcrum to rise and fall with the contour of the tank, thereby producing a perfectly round opening. An oxyacetylene torch makes it adaptable to cutting varying thicknesses. The cutter weighs only 23 lb. (Steffan Mfg. Corp.)

For more data circle No. 50 on postcard, p. 175

Evaporator

A continuous water-sample evaporator automatically collects, weight-measures, concentrates and



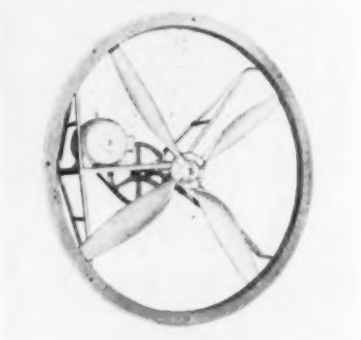
records as many as one million separate samples into a single, final sample of any desired concentration. Thus, relatively simple and

inexpensive purity test methods can be used to reveal purity (or impurity) levels thousands of times greater than possible, if using the same methods with random sampling techniques. Inlet water and heater controls are interlocked to prevent boiling of sample water at any time. A manually-set timer control concentrates the final sample to a minimum desirable volume. (Diamond Power Speciality Corp.)

For more data circle No. 51 on postcard, p. 175

High-Volume Fans

Increasing efficiency and economy where large volumes of air must be moved, use of any one of a series of high-volume fans does the job of several smaller units. The series includes sizes from 65 to 94 in. in belt-drive, direct-drive or pulley-drive construction. The 94-



in., 25-hp model moves 174,000 cu ft per minute at free air, or 157,000 cu ft per minute against ¼-in. static pressure. Hubs and blades on these fans are aluminum-alloy castings. (Hartzell Propeller Fan Co.)

For more data circle No. 52 on postcard, p. 175

Contaminant Remover

Fuel and solvent contamination problems are simply and inexpensively solved through the use of a funnel made of unbreakable plastic. Unlike other funnels, it has an amazing water and contaminant stripper disk that stops water, dirt, rusts, etc. Use of the funnel prevents the watering down of solvents; and it allows fuel to pass through it freely. (Aquadynamics, Inc.)

For more data circle No. 53 on postcard, p. 175

NEW BOOKS

"Gas Shielded-Arc Welding," describes in detail the group of processes which originally went under the name of inert-gas processes. The book contains 39 illustrations and nine tables. 78 pp. $1.50. American Welding Society, 33 West 39th St., New York 18.

"Investigation of Fatigue Properties at Room Temperature of High-Strength Steels Having High Tempering Temperatures" by H. N. Cummings and others, deals with the fatigue of high-strength steels at normal room temperatures. This report makes a statistical investigation of the fatigue characteristics of missiles and other flight vehicles. Emphasis is placed on testing of materials with high strength-to-weight ratios—designed for high operating temperatures. Materials tested and reported on, include: steel for general structural use; steel used in springs; steel for space-vehicle surfaces; and steel used for bearings. 105 pp. $2.50. Office of Technical Services (Order PB 161144), U. S. Department of Commerce, Washington 25.

"Principles of Quantum Mechanics" by W. V. Houston, is written for the student with a knowledge of elementary mathematical physics who wishes to acquire a greater familiarity with quantum analysis. 288 pp. Soft-cover edition. $1.85. Dover Publications, Inc., 180 Varick St., New York 14.

"Foundry Radiation Protection Manual" describes radiation protection controls for the foundry industry. Beginning with basic information about the characteristics of radiation in general, the manual describes the sources of radiation currently being used in foundries. To many people, the possibility of exposure to radiation is extremely frightening. An understanding of how radiation can be handled safely will dispel the awesome impression that prevails among unin-

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NEW BOOKS

formed workers in industry. The manual covers a wide range of radiation origins, including the commonplace X-ray source. $9.00. American Foundrymen's Society, Golf & Wolf Roads, Des Plaines, Ill.

"Qualitative Aspects of Fatigue of Materials" by H. N. Cummings, reports on investigations of the variables which affect the fatigue life and strength of metals. The book outlines ways to insure a satisfactory life for metal parts and structures. Metal fatigue is measured by the researchers in terms of cycles of loading and unloading. Variables affecting this fatigue life are discussed qualitatively, and theories on the mechanism of fatigue are reviewed. 263 pp. $4.00. Office of Technical Services (Order PB 161145), U. S. Department of Commerce, Washington 25.

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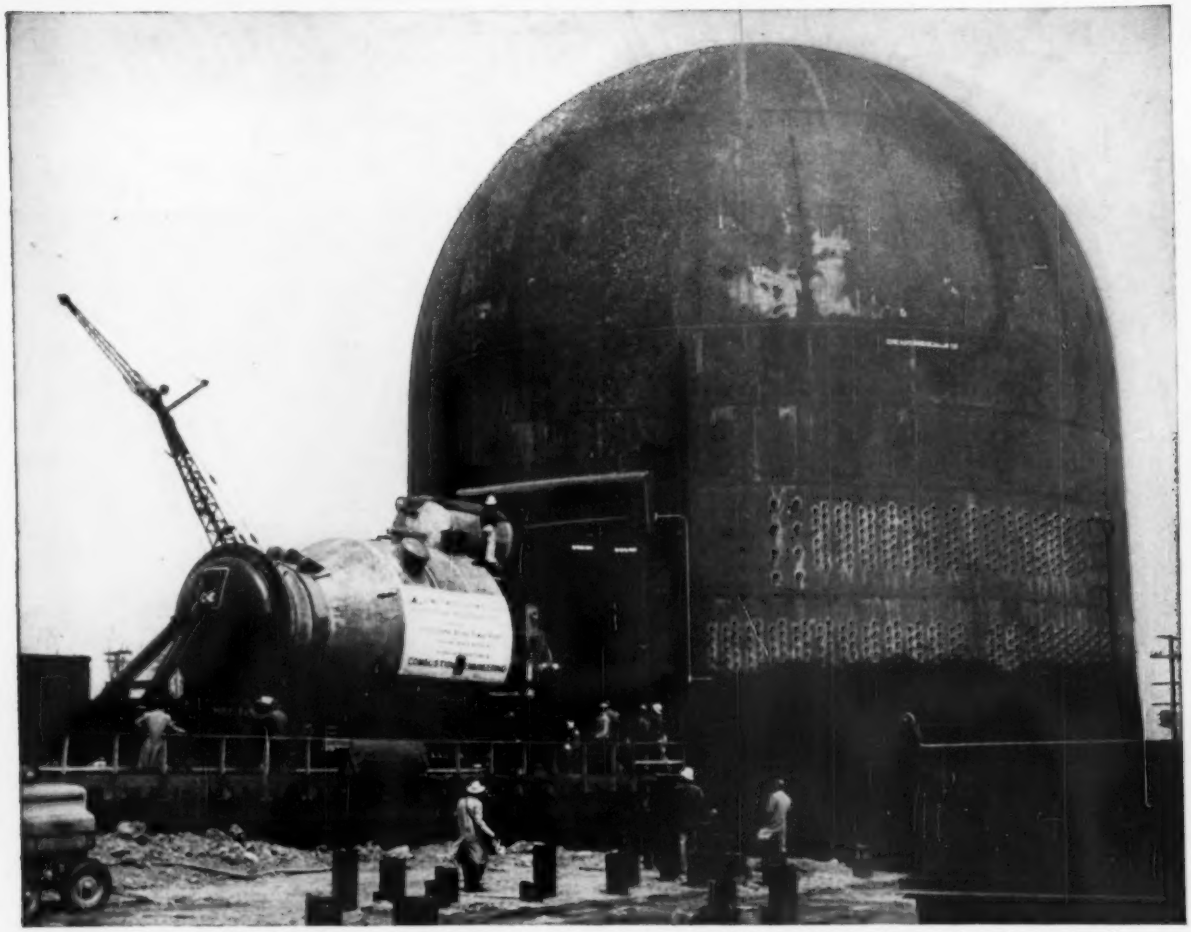

Atoms for Peace. This dome houses the 91-ton reactor vessel made of nickel-containing stainless steel for the new Enrico Fermi Atomic Power Plant on the shore of Lake Erie near Monroe, Michigan. Detail design and construction of the reactor vessel was done by Combustion Engineering, Inc. Plant will be built and operated by Power Reactor Development Company from designs supplied by Atomic Power Development Associates, Inc.

Atomic reactor "breeds" its own fuel

Stainless steel vessel must withstand high temperatures and corrosives

The world's largest full-scale nuclear reactor of the "fast-breeder" type is now being built. It may well answer the question:

> *When will atomic power be competitive with conventional methods of producing electric power?*

As the term "fast-breeder" indicates, the atom-splitting process is maintained by so-called *fast* or high-energy particles. It produces more nuclear fuel than it consumes. The fast-breeder actually turns out a kilogram and a fifth of new fuel for each kilogram it burns up!

The "breeding" takes place in a 36-foot high pressure vessel. Here, the high-energy particles (neutrons) travel at speeds of thousands of miles per second to keep the atom-splitting chain reaction going.

Accent on safety. A major objective was to make this reactor vessel safe. That called for a lot of highly specialized work.

It also called for a rugged metal: one capable of withstanding the tremendous heat given off in nuclear fission, and of bearing up under the temperatures and corrosives encountered. The final choice? Strong, corrosion-resisting Type 304 stainless steel. It's a stainless steel that contains Nickel – one of the big reasons for these superior properties.

How to "fast-breed" ideas. Problems involving reactor materials may never be a concern of yours. But you can run into *metal selection problems* involving corrosion, pressures, high temperatures and other destructive conditions almost any time. When you do, remember there is a good chance that a steel containing Nickel will provide the properties you want. Let us help you find out.

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News about the nation's leading steel plate specialist

Helping solve customers' problems is the job of Lukens' Technical Service Department. Here are four members: (left to right) Lou Keay, Metallurgist and Department Manager; Les Dawson and Harry McClure, Welding Engineers; Dick Rote, Metallurgist.

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In our shops we test materials for specific jobs. We develop fabricating procedures, welding techniques, flamecutting, forming, machining. We compile data. We keep building a fund of information that can help fabricators make better use of Lukens carbon, alloy and clad plate products.

What our Technical Service Engineers learn in our shop they take into your shop. Before, during and after a job, they're available to assist you.

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The Iron Age Summary

Orders Lag as Users Retrench

Most steel users are buying as little as possible. One eye is on inventory, the other on sales.

The market won't level out until new orders are in line with consumption of steel.

■ The shakedown of the steel market is not yet ended. Unless a wave of new orders supports the market, present rates of operations can not be sustained and the ingot rate will drop sharply in April and May.

The Reasons—The disappointing rate of orders has three main causes. These are:

Severe cutbacks in automotive production ahead which are already reflected in cancellations and deferments.

Cutbacks in railroad freight car programs which had been expected to sustain the heavy steel market.

Inventory control practices in which even major users are operating with as little steel in stock as possible.

Plus Factors — However, there are some plus factors in the market which may soften the April-May drop in business.

Some seasonal support can be expected from users who have already accomplished inventory control and will resume normal buying geared to consumption.

Mills are actively working on export business and finding some orders. There is a fair export market for cold-rolled sheets in Europe because of a shortage of rolling capacity.

The capital spending plans of industry indicate a good market for products that go into new plants and equipment.

Orders Far Behind—But as the market stands today, shipments of steel are in excess of consumption, but consumption is well ahead of current rate of orders.

This means that the market will level off when backlogs are wiped out and new orders are geared at the rate of consumption. But this point is still some time ahead.

Stainless Hard Hit—The stainless steel market is hardest hit. This is because a large percentage of the stainless capacity operated through the steel strike. The strike ended with users in relatively good shape on stainless stocks and the market "correction" first occurred there.

The market for flat-rolled products continues good and most mills are sold out through April on cold-rolled sheets in spite of cancellations. Galvanized remains strong, with demand staying ahead of supply.

April will be a good month in terms of shipments, but rate of orders now indicates the sharp drop in operating rates will come then. Where the leveling off point will be is still anybody's guess.

Export—In line with export, Republic Steel Corp. plans to ship 6000 tons of wide auto sheet to Great Britain this year through the St. Lawrence Seaway. Previously, similar shipments have gone by rail to East Coast ports from Cleveland. Shipments will be 48-in. and 72-in. sheets in 19 and 20 gage. Auto companies in Britain are in a pinch for cold-rolled steel and European mills roll 48-in. maximum width.

Steel Output, Operating Rates

Production	This Week	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	2,527	2,597	2,645	2,638
Ingot Index				
(1947-1949=100)	157.3	161.7	164.7	164.2
Operating Rates				
North East Coast	86.0	86.0	90.0	97.0
Buffalo	94.0	103.0*	99.0	96.0
Pittsburgh	88.0	90.0	86.0	96.0
Youngstown	78.0	81.0*	87.0	88.0
Cleveland	99.0	103.0*	97.0	100.0
Detroit	99.0	105.0*	102.0	99.0
Chicago	94.0	97.0*	96.0	92.0
Cincinnati	101.0	103.0*	104.0	82.0
St. Louis	99.0	96.0*	97.0	99.0
South	88.0	89.0*	86.0	98.0
West	75.0	76.0*	88.0	93.0
U. S. Rate	88.7	91.1	92.8	93.2

*Revised
Source: American Iron And Steel Institute

Prices At a Glance

(Cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.41	$66.41	$66.41	$66.41
Scrap No. 1 hvy (Gross ton)	$33.17	$33.33	$34.50	$37.83
No. 2 bundles	$22.33	$22.67	$21.83	$25.83
Nonferrous				
Aluminum ingot	28.10	28.10	28.10	26.80
Copper, electrolytic	33.00	33.00	33.00	31.50
Lead, St. Louis	11.80	11.80	11.80	11.30
Magnesium	36.00	36.00	36.00	36.00
Nickel, electrolytic	74.00	74.00	74.00	74.00
Tin, Straits, N. Y.	99.75	99.875	100.00	103.00
Zinc, E. St. Louis	13.00	13.00	13.00	11.00

Purchasers Turn to Selling

Purchasing men at Westinghouse's East Pittsburgh works have a purchasing system that almost makes them salesmen.

The practice of displaying new products for plant users to see has shown results.

■ Purchasing men are selling rather than buying in a new program at the East Pittsburgh works at Westinghouse Electric Corporation.

The plant's purchasing department is working hard to sell new products and new ideas of suppliers to technical men in other departments. Another sales pitch has been directed at the suppliers, explaining the workings of the program.

In Full View — Each month about 30 new products are mounted on a board in purchasing. Technical men are invited to come in and examine the display. A newsletter describing the products goes out to plant design, manufacturing, maintenance and laboratory people.

In two years of operation, the program has brought these results: More than 460 new products have been displayed. More than 80 products have been adopted; nearly 300 are under investigation. Salesmen's new products have been exposed to hundreds of new outlets in the plant. Communications between purchasing and technical groups has improved.

Great Needs — The East Pittsburgh plant employs over 10,000 men. It spends up to $100 million a year for outside goods and services. The plant makes highly engineered products—generators, motors, switchgear and other types of heavy apparatus. More than 1000 engineers and technicians are included in the work force.

The sheer size of this operation explains in part the need for special lines of communications. Salesmen and product buyers have their hands full keeping up with current needs.

Still Young — East Pittsburgh's purchasing department, under D. A. Riggs, began its New Products-New Ideas section in February of 1958. At that time, purchasing agent W. C. Meyer sent a brief letter to suppliers, explaining the purpose of the program and asking for samples.

Supplying companies reacted to the invitation with varying degrees of enthusiasm. Some jumped at the chance to display products in one of the country's largest plants.

Some Hesitation—Others didn't seem to get the idea right away. The announcement apparently just didn't register on them. In July of 1959, a second letter was mailed. This time, suppliers were reminded of the purchasing potential of East Pittsburgh. They were given a list of the 160 companies that had already participated.

This information stirred strong interest, particularly among companies who saw their competitors' names listed for displays. New products began coming in at a faster rate. More than 200 were submitted in the next six months.

In High Gear—Now, the program is moving in high gear. Posters placed on buyers' desks invite salesmen to display samples of their new products. Small cards, to be picked up by the salesmen, have proved a very effective reminder.

ACROSS THE BOARD: Salesmen hold seminars with Westinghouse employees to illustrate benefits of new products. The product display board, constantly replenished with new products, is in the rear.

Here's a "before" and "after" bearing problem solved by Bearings, Inc.

A large steel mill customer has six cranes with bridge line shafts equipped with the solid housing pillow blocks shown in the "before" photograph. Whenever one of the line shaft bearings needed to be replaced, the entire section of shaft had to be removed. Maintenance costs and crane downtime were excessive and costly. Our engineers were asked for a solution.

THE PROBLEM: Due to the extremely low base to center of shaft dimension of the original bearing, a conventional split housing, split roller bearing pillow block could not be used.

THE ANSWER: We designed and furnished a special split housing pillow block (see "after" photo) incorporating split bearings and split seals which maintain the original dimensions. These can be installed or replaced on the crane in a fraction of the time formerly required just to dismantle the line shaft.

This is just one of many successful solutions of a tough bearing problem. We can help you solve your bearing problems and supply replacement bearings from the stock carrying branch near you. We're authorized distributors for all nationally known bearings. Call us!

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Steel Deliveries Back to Normal

The past month has brought a drastic change in the delivery promises made by mills.

With few exceptions, buyers can now expect delivery based on normal lead times.

■ The steel pinch is over. If there have been any lingering doubts, they can be quickly disspelled by a glance at this month's delivery promises (see table below).

In just about all cases in all districts, mills are promising normal deliveries. In many cases, they promise better than normal deliveries. The only instances where little or no improvement has been made in delivery times are those where the market and products were already at minimum lead time.

Back to Normal—Cleveland, the last stronghold of the tight market, has undergone the greatest change. Delivery promises for sheet and strip products have been cut in half. A month ago the best mills would offer was delivery in two to three months. Now, after a raft of automotive cancellations and smaller-than-expected orders, cold-rolled sheet and strip can be booked for delivery in 6 to 8 weeks. And hot-rolled sheet and strip can be had in as little as four weeks.

Just about two weeks have been knocked off of the delivery times for these items in other districts. Delivery promises of 6 to 8 weeks for cold-rolled products, and 4 to 6 weeks for hot-rolled is usually considered "normal."

Items From Stock—Softness in pipe and merchant products markets shows up in the frequency with which these items are being offered from stock. In most cases it is only low volume items that require any appreciable lead time. And even then, delivery is promised within rolling cycles—generally about six weeks.

As steel mills continue to build inventories of semi-finished steel, further shortening of delivery promises can be expected for many items. Mills are well aware of the trend by users to let mills carry the inventory and then to buy from the producers offering the best delivery.

Sheet and Strip—Order volume varies with the district. Some mills still expect to maintain near-capacity operations in April. Others can still handle tonnage orders for the month. One mill in **Pittsburgh** reports it is booked solidly for next month. But another says it isn't sure just where it stands. It says the volume of its deferred tonnage isn't large, but day-to-day juggling makes it impossible to have an exact picture of schedules. A **Cleveland** mill has built up its stocks of semi-finished steel and expects a normal carryover position in April. The wave of automotive cancellations seems to have run its course as far as **Midwest** mills are concerned. And one reports that a major auto user just placed a new order for sheet steel, the first in some time.

Plates and Shapes—Producers of heavy steels in **Pittsburgh** say the big adjustment has taken place. But that knowledge doesn't bring any new orders in to take up the slack. There's plenty of room to handle orders for standard structurals in April.

Delivery Promises at a Glance

	East	Pittsburgh	Cleveland	Detroit	Chicago	West Coast
CR Carbon Sheet	6-8 wks	5-8 wks	6-8 wks	6-8 wks	4-6 wks	8 wks
HR Carbon Sheet	4-6 wks	4-8 wks	4-6 wks	4 wks	4-6 wks	4 wks
CR Carbon Strip	6-8 wks	4-6 wks	6-8 wks	6 wks	4-10 wks	8 wks
HR Carbon Strip	4-6 wks	4-6 wks	4-6 wks	4 wks	5-6 wks	4 wks
HR Carbon Bars	4-6 wks	1-4 wks	6-8 wks	3-6 wks	4-6 wks	1-2 wks
CF Carbon Bars	6-8 wks	3-4 wks	5-6 wks	4-8 wks	4-8 wks	2-4 wks
Heavy Plate	4-5 wks	3-5 wks			4-8 wks	6-8 wks
Light Plate	4-6 wks	3-5 wks	4-6 wks		4-6 wks	6-8 wks
Merchant Wire	Stock	Stock	4-6 wks		Stock-4 wks	2 wks
Oil Country Goods	2-6 wks	Stock	1-4 wks		4-6 wks	
Linepipe	2-6 wks	1-4 wks	1-4 wks		4-8 wks	8 wks
Buttweld Pipe	Stock	Stock	2-4 wks	Stock-6 wks	4-5 wks	1 wk
Std. Structurals	4 wks	2-4 wks	6-8 wks	4-8 wks	4-5 wks	4 wks
CR Stainless Sheet	Stock-6 wks	Stock-6 wks	3-5 wks	Stock-7 wks		
CR Stainless Strip	Stock-6 wks	Stock-6 wks	3-5 wks	Stock-6 wks		

Nail Prices Reduced

Atlantic Steel Co., Atlanta, Ga., has cut common nail prices as much as 15 pct in an effort to win back sales lost to imports.

The price reductions, which apply to nails from size two-penny up to 60-penny, average about $1.50 lower a hundred pounds.

A company spokesman said Atlantic's nail-making machines are now operating at less than 25 pct of capacity. The new prices are close to those most people in Atlanta have been paying for imported nails.

COMPARISON OF PRICES

(Effective Mar. 29, 1960)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	Mar. 29 1960	Mar. 22 1960	Mar. 1 1960	Mar. 31 1959
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10**	14.10**	14.10**	13.55
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	52.00
Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchants bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	45.00
Wrought iron bars	14.90	14.90	14.90	14.90
Wires: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 100 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	Mar. 29 1960	Mar. 22 1960	Mar. 1 1960	Mar. 31 1959
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.57	$70.57	$70.57	$70.57
Foundry, Southern Cin'ti	73.87	73.87	73.87	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	70.07	70.07	70.07	70.07
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese, 74-76 pct Mn, cents per lb‡	11.00	11.00	11.00	12.25
Pig Iron Composite: (per gross ton)				
Pig iron	$66.41	$66.41	$66.41	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$34.50	$34.50	$36.50	$41.50
No. 1 steel, Phila. area	34.50*	35.00	35.50	35.50
No. 1 steel, Chicago	30.50	30.50	31.50	36.50
No. 1 bundles, Detroit	30.50	30.50	32.50	32.50
Low phos., Youngstown	38.50*	37.50	40.50	43.50
No. 1 mach'y cast, Pittsburgh	52.50	52.50	53.50	49.50
No. 1 mach'y cast, Phila.	51.50	51.50	51.50	49.50
No. 1 mach'y cast, Chicago	52.50	52.50	53.50	54.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$33.17*	$33.33	$34.50	$37.83
No. 2 bundles	22.33*	22.67	21.83	25.83
Coke: Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	$14.75-15.50	$14.75-15.50	$14.50-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	33.00	33.00	33.00	31.50
Copper, Lake, Conn.	33.00	33.00	33.00	31.50
Tin, Straits, N. Y.	99.75*	100.25	100.00	103.00
Zinc, East St. Louis	13.00	13.00	13.00	11.00
Lead, St. Louis	11.80	11.80	11.80	11.30
Aluminum, virgin ingot	28.10	28.10	28.10	26.80
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. ** Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composites

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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Dealers Still Wait For More Buying

Bargain prices are sometimes tempting buyers into taking some tonnage.

But, in general, sellers are still hunting for orders in a quiet market.

■ Dealers and brokers keep hoping large-scale mill buying is coming. But there's not much to back up their optimism. Reduced mill operating rates, the prospect of ore shipments soon into Lakes ports, and industrial scrap offerings are all keeping the market gloomy.

The industrial lists up for bid this week should give some clue on mill thinking about prices. In most cases the tonnages are less than those offered in March.

Bargain Prices—But only strong mill interest will keep prices at those levels. Meanwhile, the low prices are tempting some mills into limited buying. They are finding it hard to pass up the bargains offered.

Present prices are doing little to stimulate scrap intake. As a result, collections have fallen off.

There are some dealers who predict privately that the market could drift along at its present pace until fall or later. They can't find any evidence the mills will return to the market in force. The trend toward hot metal is too strong, they say. And the present emphasis on cost-cutting is also keeping buyers cautious.

Pittsburgh—Most prices are unchanged in a quiet market. But there's talk of coming price strength. Some prices are too low to encourage scrap flow into yards, trade sources say. Brokers are reported paying full mill price to get shipment on No. 2 bundles. On the other hand, there's no indication mills are interested in scrap at higher prices. The new industrial lists should test mill thinking on prices. Industrial tonnage for April is off about 20 pct from March. But brokers say it will take mill support to maintain prices at the March levels.

Chicago—Last week's sales flurry died out leaving the market quiet. Out-of-the-area purchases boosted hopes the market might advance $1 to $2 a ton. Some brokers had to cover old orders at higher prices. But mills moved quietly to establish tonnage sales at previous price levels. The prospect of early ore shipments on the Lakes also depressed the market.

Philadelphia — Last week's $2 spread on No. 1 and No. 2 heavy melting has disappeared. Brokers are no longer willing to pay $1 premium at the docks to compete with inland mills. Buying by the mills is still very limited. But export should help the market in April. Four or five boats are due in for loading.

New York—There is no change in the market again this week. Export sales continue to hold up prices. A slight firming in the export market is reported. But dealers don't expect domestic mills to buy much in April.

Detroit — Dealers are trying to assess mill demand. Since steelmaking operations are still strong, and mill scrap inventories down, the dealers think there should be more interest in buying. But the mills aren't making any moves yet. As a result, there isn't any dealer optimism, just a bit less pessimism. April industrial lists are down about 15 pct below March tonnages.

Cleveland — Low prices are bringing a better over-all tone to the market as mills find it hard to resist bargains. The dealer market here picked up $1 as a local mill ordered production quality scrap.

St. Louis—More buying by local foundries and specialty users has put greater strength into the market. Some dealers believe the market has bottomed out. Gains of $1 a ton were recorded for No. 1 and No. 2 heavy melting, No. 2 dealer bundles, No. 1 RR heavy melting, and RR specialties.

Cincinnati—There is more optimism in this area on reports good-sized orders are coming for April. Right now, brokers are doing some speculating when dealers will sell at present prices.

Birmingham — The market continues quiet. New purchases by pipe makers of No. 1 cupola cast and stove plate were $1 a ton under previous buys.

Buffalo — General weakness of the market brought price declines. No. 1 grades and turnings were off $1 a ton. No. 2 grades and cast items were unchanged. In general, the market is showing very little activity.

Boston—Only a trickle of export and domestic business keeps the market alive. There is very little activity and prices of steelmaking grades are static.

West Coast—The market is listless all along the Coast. Mills are taking in very little material. No. 1 cupola cast dropped $1 a ton.

Houston — Prospects are for a continued slow market through April. As a result, sellers are gloomy. Intake into yards is off because of the low prices offered.

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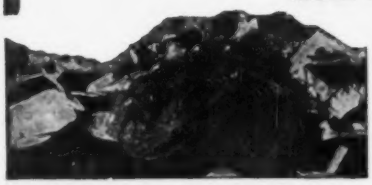

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SCRAP PRICES *(Effective Mar. 29, 1960)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$34.00 to $35.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 dealer bundles	36.00 to 37.00
No. 1 factory bundles	41.00 to 42.00
No. 2 bundles	25.00 to 26.00
No. 1 busheling	34.00 to 35.00
Machine shop turn.	18.00 to 19.00
Shoveling turnings	23.00 to 24.00
Cast iron borings	22.00 to 23.00
Low phos. punch'gs plate	41.00 to 42.00
Heavy turnings	30.00 to 31.00
No. 1 RR hvy. melting	38.00 to 39.00
Scrap rails, random lgth.	52.00 to 53.00
Rails 2 ft and under	57.00 to 58.00
RR specialties	45.00 to 46.00
No. 1 machinery cast.	52.00 to 53.00
Cupola cast.	46.00 to 47.00
Heavy breakable cast.	44.00 to 45.00
Stainless	
18-8 bundles and solids	220.00 to 225.00
18-8 turnings	115.00 to 120.00
430 bundles and solids	125.00 to 130.00
410 turnings	60.00 to 65.00

Chicago

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	31.00 to 32.00
No. 1 factory bundles	35.00 to 36.00
No. 2 bundles	19.00 to 21.00
No. 1 busheling	30.00 to 31.00
Machine shop turn.	15.00 to 16.00
Mixed bor. and turn.	17.00 to 18.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	17.00 to 18.00
Low phos. forge crops	43.00 to 44.00
Low phos. punch'gs plate, ½ in. and heavier	39.00 to 40.00
Low phos. 2 ft and under	37.00 to 38.00
No. 1 RR hvy. melting	33.00 to 34.00
Scrap rails, random lgth.	45.00 to 46.00
Rerolling rails	53.00 to 54.00
Rails 2 ft and under	52.00 to 53.00
Angles and splice bars	44.00 to 45.00
RR steel car axles	50.00 to 51.00
RR couplers and knuckles	41.00 to 42.00
No. 1 machinery cast.	52.00 to 53.00
Cupola cast.	43.00 to 44.00
Cast iron wheels	39.00 to 40.00
Malleable	52.00 to 53.00
Stove plate	40.00 to 41.00
Steel car wheels	42.00 to 43.00
Stainless	
18-8 bundles and solids	215.00 to 220.00
18-8 turnings	115.00 to 120.00
430 bundles and solids	115.00 to 120.00
430 turnings	55.00 to 60.00

Philadelphia Area

No. 1 hvy. melting	$34.00 to $35.00
No. 2 hvy. melting	30.00 to 31.00
No. 1 dealer bundles	36.00 to 37.00
No. 2 bundles	21.00 to 22.00
No. 1 busheling	36.00 to 37.00
Machine shop turn.	19.00 to 20.00
Mixed bor. short turn.	18.00 to 19.00
Cast iron borings	18.00 to 19.00
Shoveling turnings	22.00 to 23.00
Clean cast. chem. borings	26.00 to 27.00
Low phos. 5 ft and under	37.00 to 38.00
Low phos. 2 ft punch'gs	40.00 to 41.00
Elec. furnace bundles	37.00 to 38.00
Heavy turnings	28.00 to 29.00
RR specialties	44.00 to 45.00
Rails, 18 in. and under	58.00 to 60.00
Cupola cast.	41.00 to 42.00
Heavy breakable cast.	42.00 to 43.00
Cast iron car wheels	46.00 to 47.00
Malleable	59.00 to 60.00
No. 1 machinery cast.	51.00 to 52.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	31.00 to 32.00
No. 2 bundles	20.00 to 21.00
Machine shop turn.	15.00 to 16.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	18.00 to 19.00
Low phos. 18 in. and under	42.00 to 43.00
Rails, random length	48.00 to 49.00
Rails, 18 in. and under	53.00 to 54.00
No. 1 cupola cast.	41.00 to 42.00
Hvy. breakable cast.	36.00 to 37.00
Drop broken cast.	50.00 to 51.00

Youngstown

No. 1 hvy. melting	$37.00 to $38.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	37.00 to 38.00
No. 2 bundles	22.00 to 23.00
Machine shop turn.	16.00 to 17.00
Shoveling turnings	20.00 to 21.00
Low phos. plate	38.00 to 39.00

Cleveland

No. 1 hvy. melting	$33.50 to $34.50
No. 2 hvy. melting	23.50 to 24.50
No. 1 dealer bundles	33.50 to 34.50
No. 1 factory bundles	37.50 to 38.50
No. 2 bundles	19.00 to 20.00
No. 1 busheling	33.50 to 34.50
Machine shop turn.	13.00 to 14.00
Mixed bor. and turn.	17.00 to 18.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	17.00 to 18.00
Cut structural & plates, 2 ft & under	40.00 to 41.00
Drop forge flashings	33.50 to 34.50
Low phos. punch'gs plate	34.50 to 35.50
Foundry steel, 2 ft & under	34.00 to 35.00
No. 1 RR hvy. melting	37.00 to 38.00
Rails 2 ft and under	57.00 to 58.00
Rails 18 in. and under	61.00 to 62.00
Steel axle turnings	24.00 to 25.00
Railroad cast.	55.00 to 56.00
No. 1 machinery cast.	55.00 to 56.00
Stove plate	48.00 to 49.00
Malleable	52.00 to 53.00
Stainless	
18-8 bundles	210.00 to 220.00
18-8 turnings	90.00 to 100.00
430 bundles	105.00 to 115.00

Buffalo

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 busheling	30.00 to 31.00
No. 1 dealer bundles	30.00 to 31.00
No. 2 bundles	22.00 to 23.00
Machine shop turn.	14.00 to 15.00
Mixed bor. and turn.	15.00 to 16.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	16.00 to 17.00
Low phos. plate	40.00 to 41.00
Structurals and plate, 2 ft and under	40.00 to 41.00
Scrap rails, random lgth.	38.00 to 39.00
Rails 2 ft and under	48.00 to 49.00
No. 1 machinery cast.	48.00 to 49.00
No. 1 cupola cast.	45.00 to 46.00

St. Louis

No. 1 hvy. melting	$34.00 to $35.00
No. 2 hvy. melting	32.00 to 33.00
Foundry steel, 2 ft	35.00 to 36.00
No. 1 dealer bundles	34.00 to 35.00
No. 2 bundles	22.00 to 23.00
Machine shop turn.	14.00 to 15.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	20.00 to 21.00
No. 1 RR hvy. melting	37.00 to 38.00
Rails, random lengths	43.00 to 44.00
Rails, 18 in. and under	47.00 to 48.00
RR specialties	43.00 to 44.00
Cupola cast.	49.00 to 50.00
Heavy breakable cast.	37.00 to 38.00
Stove plate	40.00 to 41.00
Cast iron car wheels	39.00 to 40.00
Rerolling rails	54.00 to 55.00
Unstripped motor blocks	39.00 to 40.00

Birmingham

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	31.00 to 32.00
No. 2 bundles	21.00 to 22.00
No. 1 busheling	37.00 to 38.00
Machine shop turn.	21.00 to 22.00
Shoveling turnings	22.00 to 23.00
Cast iron borings	12.00 to 13.00
Electric furnace bundles	37.00 to 38.00
Elec. furnace, 3 ft & under	35.00 to 36.00
Bar crops and plate	41.00 to 42.00
Structural and plate, 2 ft	40.00 to 41.00
No. 1 RR hvy. melting	33.00 to 34.00
Scrap rails, random lgth.	45.00 to 46.00
Rails, 18 in. and under	50.00 to 51.00
Angles and splice bars	42.00 to 43.00
Rerolling rails	51.00 to 52.00
No. 1 cupola cast.	48.00 to 49.00
Stove plate	48.00 to 49.00
Cast iron car wheels	38.00 to 39.00
Unstripped motor blocks	38.00 to 39.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	22.00 to 23.00
No. 2 dealer bundles	16.00 to 17.00
Machine shop turnings	9.00 to 10.00
Mixed bor. and turn.	10.00 to 11.00
Shoveling turnings	11.00 to 12.00
Clean cast. chem. borings	21.00 to 22.00
No. 1 machinery cast.	39.00 to 40.00
Mixed yard cast.	36.00 to 37.00
Heavy breakable cast.	34.00 to 35.00
Stainless	
18-8 prepared solids	195.00 to 200.00
18-8 turnings	85.00 to 90.00
430 prepared solids	80.00 to 85.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$28.00 to $29.00
No. 2 hvy. melting	16.00 to 17.00
No. 1 dealer bundles	30.00 to 31.00
No. 2 bundles	15.00 to 16.00
No. 1 busheling	28.00 to 29.00
Drop forge flashings	28.00 to 29.00
Machine shop turn.	11.00 to 12.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Heavy breakable cast.	37.00 to 38.00
Mixed cupola cast.	43.00 to 44.00
Automotive cast.	49.00 to 50.00
Stainless	
18-8 bundles and solids	200.00 to 205.00
18-8 turnings	70.00 to 75.00
430 bundles and solids	85.00 to 90.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$27.00 to $28.00
No. 2 hvy. melting	22.00 to 23.00
No. 1 dealer bundles	27.00 to 28.00
No. 2 bundles	13.00 to 14.00
No. 1 busheling	27.00 to 28.00
Machine shop turn.	6.00 to 7.00
Shoveling turnings	9.00 to 10.00
Clean cast. chem. borings	14.50 to 15.50
No. 1 machinery cast.	39.00 to 40.00
Mixed cupola cast.	32.00 to 33.00
Heavy breakable cast.	31.00 to 32.00

San Francisco

No. 1 hvy. melting	$35.00
No. 2 hvy. melting	31.00
No. 1 dealer bundles	31.00
No. 2 bundles	20.00
Machine shop turn.	15.00
Cast iron borings	15.00
No. 1 cupola cast.	46.00

Los Angeles

No. 1 hvy. melting	$35.00
No. 2 hvy. melting	32.00
No. 1 dealer bundles	31.00
No. 2 bundles	17.00
Machine shop turn.	16.00
Shoveling turnings	16.00
Cast iron boring	16.00
Elec. furn. 1 ft and under (foundry)	45.00
No. 1 cupola cast.	39.00

Seattle

No. 1 hvy. melting	$35.00
No. 2 hvy. melting	33.00
No. 2 bundles	22.00
No. 1 cupola cast.	36.00
Mixed yard cast.	36.00

Hamilton, Ont.

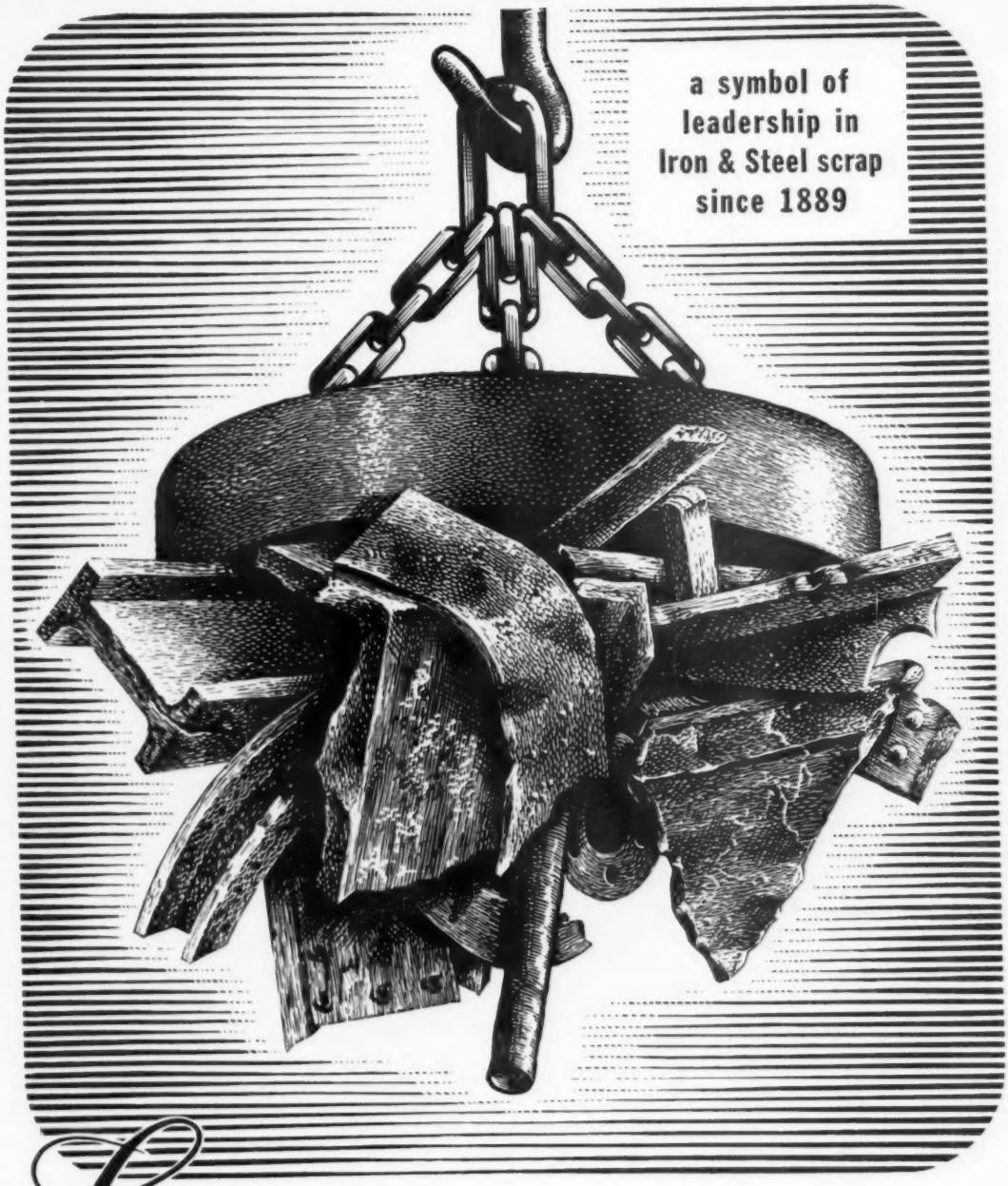
Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.25
No. 2 hvy. melting	28.25
No. 1 dealer bundles	32.25
No. 2 bundles	24.00
Mixed steel scrap	24.25
Bush., new fact., prep'd	32.25
Bush., new fact., unprep'd	26.25
Machine shop turn.	14.00
Short steel turn.	17.00
Mixed bor. and turn.	13.00
Cast scrap	$46.50 to 48.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$34.00
No. 2 hvy. melting	31.00
No. 2 bundles	19.00
Machine shop turn.	16.00
Shoveling turnings	20.00
Cut structural plate 2 ft & under	$43.50 to 44.50
Unstripped motor blocks	32.00 to 33.00
Cupola cast.	39.00 to 40.00
Heavy breakable cast.	29.00 to 30.00



Luria Brothers and Company, Inc.

MAIN OFFICE

CHRYSLER BUILDING EAST

New York, N. Y.

PLANTS

READING, PENNA. MODENA, PENNA.

OFFICES

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CHICAGO, ILLINOIS	LOS ANGELES, CAL.	READING, PENNA.
CINCINNATI, OHIO	MEMPHIS, TENN.	ST. LOUIS, MISSOURI
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DETROIT, MICHIGAN		SEATTLE, WASH.

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Progress Report On Zinc Research

American Zinc Institute gets a progress report on its Expanded Research Program.

Indications are that the wide program will result in new markets for zinc.

■ Next week members of the American Zinc Institute will converge on St. Louis for their 42nd Annual Meeting.

As usual, the latest in markets and production techniques will get a thorough going over. But there'll be another talk this year that will generate wide interest from both consumers and makers.

Progress Report — Institute research director Dr. S. F. Radtke will report on the Expanded Research Program that the members have been financing for the last year and a half. The project is now far enough along for trends to start showing.

The aim of the program is creation of "appropriate new knowledge and potential new products and uses aimed at increasing the world wide consumption of zinc."

To qualify for funds, a proposal needs only approval of the industry development committee within AZI. Initial emphasis has been on "developing new uses for zinc because of growing competition from aluminum, magnesium, stainless steel, plastics."

Project List—Here are some of the projects on which Dr. Radtke will report:

A basic program to develop improved zinc diecasting alloys is progressing at New Jersey Zinc Co. Immediate target is zinc-aluminum alloys which will have greater strength and creep resistance at high temperatures.

Southern Research Institute and the Case Institute of Technology are both working on galvanized problems. Southern is looking for a cure to "wet storage stain" which occurs when water is trapped between steel and coating. Researchers are testing organic compounds to find an inhibitor or barrier to the moisture.

Corrosion Battle — At Case they're seeking ways to protect galvanized hot water tanks from corrosion due to softeners and other water constituents, and thus extend the tank's life. Cathodic protection is now the apparent answer.

Lithographic Technical Foundation is seeking ways and means of extending service life of zinc plates. The approach: Improve nonprinting areas. The Foundation says development of new alloys containing controlled amounts of titanium and copper look very promising.

Better Finishes—A major project, being done at Battelle Memorial Institute, is development of improved finishes for zinc diecastings. Work along these lines has been well organized since 1956 and was incorporated into the Institute program when it was started in 1958.

Two systems being tried at Battelle show promise of providing corrosion resistance better than industrial chrome plating as it is now generally done.

The Systems—The first is the "duplex nickel process"—two layers of nickel electro-deposited in different baths. Battelle says tests indicate this, along with the conventional copper undercoat and chrome finish, offers better corrosion resistance than the same thickness of a single bright nickel layer.

The second method is a thin, modified, bright, and crack-free chromium coat over conventional layers of copper and nickel. Some researchers think the ultimate solution may be a combination.

In Batteries, Too—Dry cell makers and sheet fabricators are cooperating to improve the quality and performance of zinc battery cans used in dry cells.

Rolled zinc producers, building contractors, and the AZI will soon cooperate in testing rolled zinc for some architectural uses — roofing, flashing, downspouts and gutters. The first step is install test items in various regions to assemble performance data.

And recently Rensselaer Polytechnic Institute began a study of the fundamental characteristics of zinc powder metallurgy.

Tin prices for the week: March 23—99.75; March 24—99.625; March 25—99.75; March 28—99.75*; March 29—99.875*.
* Estimates.

Primary Prices

(cents per lb)	current price	last price	date of change
Aluminum pig	26.00	24.70	12/17/59
Aluminum ingot	28.10	26.80	12/17/59
Copper (E)	33.00	30-33	11/12/59
Copper (CS)	33.00	35.00	3/11/60
Copper (L)	33.00	31.50	11/6/59
Lead, St. L.	11.80	12.30	12/21/59
Lead, N. Y.	12.00	12.50	12/21/59
Magnesium ingot	38.00	34.50	8/13/58
Magnesium pig	35.25	33.75	8/13/58
Nickel	74.00	64.50	12/6/58
Titanium sponge	150-160	162-182	8/1/59
Zinc, E. St. L.	13.00	12.50	1/8/60
Zinc, N. Y.	13.50	13.00	1/8/60

ALUMINUM: 99% ingot COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig Velasco, Tex. NICKEL: Port Colborne, Canada. ZINC: prime western. TIN: See above; **Other primary prices, pg. 138.**

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.038	.048-.061	.077-.096	.136-.250
1100, 3003	47.8	47.3	46.2	45.1
5052	54.2	53.0	50.8	49.2
6061-0	51.0	49.8	47.9	46.0

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	44.7-46.2	53.2-60.8
18-32	45.2-46.8	57.7-79.9
33-38	48.8-51.4	83.3-94.5
39-44	58.7-62.4	99.9-121.0

Screw Machine Stock—2011-T-3

Size"	¼	⅜-⅝	¾-1	1¼-1½
Price	62.0	61.2	59.7	57.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.411	$1.884	$2.353	$2.823
.024 gage	1.762	2.349	2.937	3.524

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	103.1
AZ31B Spec.	.....	93.3	96.9	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting) ..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	138	120	138
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	130	110	126
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	57.13	.....	54.86	58.32
Brass, Yellow	50.57	50.86	50.26	54.23
Brass, Low	53.53	53.83	53.22	57.09
Brass, R L	54.58	54.87	54.27	58.14
Brass, Naval	55.12	.....	48.68	58.78
Munts Metal	53.20	.....	48.26	.....
Comm. Bs.	56.17	56.46	55.86	59.45
Mang. Bs.	58.86	.....	52.21	.....
Phos. Bs. 5%	77.44	.....	78.19	.....

Free Cutting Brass Rod 36.96

TITANIUM

(Base prices f.o.b. mill)

Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17.00. Plate, HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; Bar, HR or forged, commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.. 29.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be $74.75
Beryllium copper, per lb conta'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $71.50
Bismuth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.50
Calcium, 99.9% small lots ..... $ 4.55
Chromium, 99.8% metallic base ... $ 1.31
Cobalt, 97-99% (per lb) ... $1.75 to $1.82
Germanium, per gm, f.o.b. Miami, Okla., refined ..... 29.95 to 36.95
Gold, U. S. Treas., per troy oz.... $35.00
Indium, 99.9%, dollars per troy oz. $2.25
Iridium, dollars per troy oz.... $75 to $85
Lithium, 98% ..... $9.00 to $12.00
Magnesium sticks, 10,000 lb. 57.00
Mercury, dollars per 76-lb flask f.o.b. New York ..... $213 to $215
Nickel oxide sinter at Buffalo, N. Y., or other U. S. points of entry, contained nickel 69.60
Palladium, dollars per troy oz.. $24 to $26
Platinum, dollars per troy oz... $82 to $85
Rhodium ..... $137 to $140
Silver ingots (¢ per troy oz.)..... 91.375
Thorium, per kg. $43.00
Vanadium ..... $ 3.65
Zirconium sponge ..... $ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
- No. 115 ..... 30.75
- No. 120 ..... 29.75
- No. 123 ..... 28.75

80-10-10 ingot
- No. 305 ..... 35.25
- No. 315 ..... 33.00

88-10-2 ingot
- No. 210 ..... 44.00
- No. 215 ..... 40.75
- No. 245 ..... 36.00

Yellow ingot
- No. 405 ..... 24.75

Manganese bronze
- No. 421 ..... 29.25

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
- 0.30 copper max. 25.75-26.00
- 0.60 copper max. 25.50-25.75

Piston alloys (No. 132 type)..28.00-29.00
No. 12 alum. (No. 2 grade)...24.75-25.25
108 alloy 25.25-25.75
195 alloy 27.75-28.75
13 alloy (0.60 copper max.)...25.75-26.00
AXS-679 (1 pct zinc) 25.00-26.00

Steel deoxidizing aluminum notch bar granulated or shot

Grade 1—95-97½% 25.25-26.25
Grade 2—92-95% 24.00-25.00
Grade 3—90-92% 23.00-24.00
Grade 4—85-90% 22.50-23.50

SCRAP METAL

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	29	28¼
Yellow brass	22¼	20¼
Red brass	25¾	25
Comm. bronze	26½	26
Mang. bronze	20¾	20
Free cutting rod ends.	21¼	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	26½
No. 2 copper wire	23¾
Light copper	21½
*Refinery brass	21¾
Copper bearing material	21

*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	26½
No. 2 copper wire	23½
Light copper	21¼
No. 1 composition	20
No. 1 comp. turnings	19½
Hvy. yellow brass solids	15
Brass pipe	14½
Radiators	16
Aluminum	
Mixed old cast.	14½—15½
Mixed new clips	16½—17½
Mixed turnings, dry	15 —16

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass	
No. 1 copper wire	23 —23½
No. 2 copper wire	20 —20½
Light copper	18 —18½
Auto radiators (unsweated)	12½—13
No. 1 composition	16½—17
No. 1 composition turnings	15½—16
Cocks and faucets	13 —13½
Clean heavy yellow brass	11¾—12¼
Brass pipe	13½—14
New soft brass clippings	14 —14½
No. 1 brass rod turnings	11½—12
Aluminum	
Alum. pistons and struts	7½— 8
Aluminum crankcase	11¼—11¾
1100 (2s) aluminum clippings	15 —15½
Old sheet and utensils	11¼—11¾
Borings and turnings	7 — 7½
Industrial castings	11¼—11¾
2020 (24S) clippings	12½—13
Zinc	
New zinc clippings	7 — 7⅛
Old Zinc	4½— 5
Zinc routings	3¼— 3½
Old die cast scrap	2¾— 3
Nickel and Monel	
Pure nickel clippings	52-54
Clean nickel turnings	40
Nickel anodes	52-54
Nickel rod ends	52-54
New Monel clippings	28-29
Clean Monel turnings	20-23
Old sheet Monel	24-26
Nickel silver clippings, mixed	18
Nickel silver turnings, mixed	15
Lead	
Soft scrap lead	8 — 8¼
Battery plates (dry)	3 — 3¼
Batteries, acid free	2 — 2¼
Miscellaneous	
Block tin	75 —76
No. 1 pewter	55 —56
Auto babbitt	39 —40
Mixed common babbitt	9¾—10¼
Solder joints	13¼—13¾
Siphon tops	41
Small foundry type	9¾—10¼
Monotype	9¾—10¼
Lino. and stereotype	8¾— 9
Electrotype	7½— 7¾
Hand picked type shells	5¼— 5¾
Lino. and stero. dross	2¼— 2¾
Electro dross	2¼— 2¾

(Effective Mar. 29, 1960)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PIL-ING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3 B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$104.50 *A2*	$126.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*		5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Bridgeport, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3,* $114.00 *T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.525 *A1,T8, M8*	7.575 *W8*		8.40 *W8, S9,J3*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5,J3*		10.75 *A5*	8.40 *J3*	
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1,P11*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Ohio Sharon, Pa.		$99.50 *S1,* *C10*	$119.00 *C10,S1*					5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport, Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *J3,B4* 7.525 *E3*			8.40 *S9*	15.55 *S9*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*			6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

(Effective Mar. 29, 1960)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled 18 ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Cokes* 1.25-lb. base box	Electro** 0.25-lb. base box	Holloware Enameling 29 ga.
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*				7.525 *B3*	9.275 *B3*		6.40 *W6*	† Special coated mfg. terne deduct 35c from 1.25 lb. coke base box price, 0.75 lb. 0.25 lb. add 55c. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25c. **ELECTRO: 0.50-lb. add 25c; 0.75 lb. add 65c; 1.00-lb. add $1.00. Differential 1.00 lb.-0.25 lb. add 65c.		
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*				7.575 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*				7.575 *U1*	9.325 *U1*			$10.50 *U1*	$9.20 *U1*	
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*	6.775 *B3*		7.525 *B3*	9.275 *B3*	10.025 *B3*	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	
	Worcester, Mass.									6.70 *A5*			
	Trenton, N. J.												
MIDDLE WEST	Alton, Ill.									6.60 *L1*			
	Ashland, Ky.	5.10 *A7*		6.875 *A7*	6.775 *A7*		7.525 *A7*						
	Canton-Massillon, Dover, Ohio			6.875 *R1, R3*									
	Chicago, Joliet, Ill.	5.10 *W8, A1*					7.525 *U1, W8*			6.40 *A5, R3,W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*	7.65 *R3**	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*		6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*				7.525 *G3*	9.275 *G3*					
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3,Y1*	6.275 *U1, I3,Y1*	6.875 *U1, I3*	6.775 *U1, I3,Y1*	7.225 *U1*	7.525 *U1, Y1,I3*	9.275 *U1, Y1*		6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1,Y1*	7.85 *U1, Y1*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	7.95 *G2*
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*			7.225 *E2*							
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	6.775 *A7*	7.225 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3* 7.65 *R3**	6.775 *S1*	7.225 *S1*, *R3*	7.525 *R3, S1*	9.275 *R3,*				$9.10 *R3*	
	Pittsburgh, Midland, Butler, Donora, Aliquippa, McKeesport, Pa.	5.10 *U1, J3,P6*	6.275 *U1, J3,P6*	6.875 *U1, J3* 7.50 *E3**	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3*	10.025 *U1, J3*	6.40 *A5, J3,P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	7.85 *U1, J3*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3,W5*	6.875 *W3, W5* 7.50 *W3**		7.225 *W3, W5*	7.525 *W3*	9.275 *W3*			$10.40 *W5, W3*	$9.10 *W5, W3*	7.85 *W5*
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*	7.50 *J3**	6.775 *Y1*		7.525 *Y1*	9.275 *Y1*		6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*				8.25 *K1*	10.40 *K1*			$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*	6.775 *T2*					6.40 *T2,R3*	$10.50 *T2*	$9.20 *T2*	
	Houston, Texas									6.65 *S2*			

*Electrogalvanized sheets.

(Effective Mar. 29, 1960)

*7.425 at Sharon-Niles is 7.225

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*	5.675 *R3,B3*	7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *C4*		7.50 *C4*	7.95 *C4*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Harrisburg, Pa.							5.30 *P2*	6.375 *P2*			
	Milton, Pa.	5.825 *M7*	5.825 *M7*									
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*	5.675 *B3*		6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Fairless, Pa.	5.825 *U1*	5.825 *U1*		6.875 *U1*							
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.		5.675 *B3*					5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7,A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3* 6.475 *T5*	9.025 *R3,R2* 8.775 *T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*	5.675 *U1,R3, N4,P13,W8* 5.875 *L1*	7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,I3*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*	5.675 *R3*	7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R5,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Mich.	5.675 *G3*	5.675 *G3*	7.90 *P3* 7.85 *P8,B5* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5* 9.225 *B5,P3, P8*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*	5.675 *U1,I3, Y1*	7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, I1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.		5.775 *C9*									8.10 *C9*
	Sterling, Ill.	5.775 *N4*	5.775 *N4*					5.30 *N4*				8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*	5.675 *U1,J3*	7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Weirton, Wheeling, Follansbee, W. Va.							5.30 *W5*				
	Youngstown, Ohio	5.675 *U1,R3, Y1*	5.675 *U1,R3, Y1*	7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.425 *J5* 6.375 *K1*	6.425 *J5* 6.375 *K1*		7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*	6.375 *C7,B2*	9.10 *R3,P14, B5*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*	6.125 *C6*					6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*	6.425 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*	6.375 *C7* 6.425 *B2*				9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*	6.425 *B2,A10*				9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga.	5.875 *A8*	5.675 *A8*									8.00 *A8*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*	5.675 *T2,R3, C16*	8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective Mar. 29, 1960) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.
A10 Alaska Steel Mills, Inc., Seattle, Wash.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Steel Co., Pacific Coast Div.
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C4 Claymont Products Dept., Claymont, Del.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.

D1 Detroit Steel Corp., Detroit
D2 Driver, Wilbur B., Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire-Reeves Steel Corp., Mansfield, O.
E3 Enamel Products & Plating Co., McKeesport, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owenboro, Ky.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., New Castle, Ind.
I3 Inland Steel Co., Chicago, Ill.
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M6 Mystic Iron Works, Everett, Mass.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Chicago, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Steel Corp., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Div., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co., Carnegie, Pa.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Steel Corp., Los Angeles, Calif.
S13 Seymour Mfg. Co., Seymour, Conn.
S14 Screw and Bolt Corp. of America, Pittsburgh, Pa.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago.
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING

Base discounts (net) f.o.b. mills. Base price about $280 per net ton.

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½–3 In.		2 In.		2½ In.		3 In.		3½–4 In.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Youngstown *R3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fontana *K1*	*10.75	*26.00	*7.75	*22.00	*4.25	*17.50	*1.75	*16.75	*1.25	*15.75	*0.75	*15.25	0.75	*15.50								
Pittsburgh *J3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Alton, Ill. *L1*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Sharon *M3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fairless *N2*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Pittsburgh *N1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Wheeling *W5*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Wheatland *W4*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Youngstown *Y1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Indiana Harbor *Y1*	1.25	*14.0	4.25	*10.0	7.75	*5.50	10.25	*4.75	10.75	*3.75	11.25	*3.25	12.75	*3.50								
Lorain *N2*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Youngstown *R3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Fairless *N2*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Fontana *K1*	*6.25		*2.25		0.75		1.25		1.75		2.25		2.75									
Pittsburgh *J3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Alton, Ill. *L1*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Sharon *M3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Pittsburgh *N1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Wheeling *W5*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Wheatland *W4*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Youngstown *Y1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Indiana Harbor *Y1*	5.75	*8.0	9.75	*4.0	12.75	0.50	13.25	*0.75	13.75	0.25	14.25	0.75	14.75	*0.50								
Lorain *N2*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.
Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.00¢ per lb.

(Effective Mar. 29, 1960)

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.315	M-2

High-carbon chromium .955 D-3, D-5
Oil hardened manganese .595 O-2
Special carbon .38 W-1
Extra carbon .38 W-1
Regular carbon .325 W-1

Warehouse prices on and east of Mississippi are 1¢ per lb higher. West of Mississippi, 6¢ higher.

CLAD STEEL

Base prices, cents per lb f.o.b.

	Cladding	Plate (*L4, C4, A3, J2*) 10 pct	Plate (*L4, C4, A3, J2*) 15 pct	Plate (*L4, C4, A3, J2*) 20 pct	Sheet (*I2*) 20 pct
Stainless Type	302	.....	.....	.....	37.50
	304	28.80	31.55	34.30	49.00
	316	42.20	46.25	50.25	58.75
	321	34.50	37.75	41.05	47.25
	347	40.80	44.65	48.55	57.00
	405	24.60	26.90	29.25	.....
	410	22.70	24.85	27.00	.....
	430	23.45	25.65	27.90	.....

CR Strip (S9) Copper, 10 pct, 2 sides, 44.20; 1 side, 36.80.

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	5.75	6.725	7.25	.....	.....	.....
Cleveland *R5*	.....	.....	.....	.....	.....	15.35
So. Chicago *R5*	.....	.....	.....	10.10	.....	.....
Ensley *T2*	5.75	6.725	.....	.....	.....	.....
Fairfield *T2*	.....	6.725	.....	10.10	6.875	.....
Gary *U1*	5.75	.....	.....	.....	6.875	.....
Huntington, *C16*	.....	6.725	.....	.....	.....	.....
Ind. Harbor *I5*	.....	.....	.....	10.10	.....	.....
Johnstown *B5*	.....	6.725	.....	.....	.....	.....
Joliet *U1*	.....	.....	7.25	.....	.....	.....
Kansas City *S2*	.....	.....	.....	10.10	.....	15.35
Lackawanna *B5*	5.75	6.725	7.25	.....	6.875	.....
Lebanon *B5*	.....	.....	7.25	.....	.....	15.35
Minnequa *C6*	5.75	7.225	7.25	10.10	6.875	15.35
Pittsburgh *S14*	.....	.....	.....	.....	.....	15.35
Pittsburgh *J3*	.....	.....	.....	10.10	.....	.....
Seattle *B2*	.....	.....	.....	.....	6.75	15.85
Steelton *B5*	5.75	.....	7.25	.....	6.875	.....
Struthers *Y1*	.....	.....	.....	10.10	.....	.....
Torrance *C7*	.....	.....	.....	.....	6.75	.....
Williamsport *S5*	.....	6.725	.....	.....	.....	.....
Youngstown *R5*	.....	.....	.....	10.10	.....	.....

COKE

Net-Ton

Furnace, beehive (f.o.b.)
Connellsville, Pa. $14.75 to $15.50
Foundry, beehive (f.o.b.) $18.50
Foundry oven coke
Buffalo, del'd $33.25
Ironton, O., f.o.b. 30.50
Detroit f.o.b. 32.00
New England, del'd 33.55
New Haven, f.o.b. 31.00
Kearney, N. J., f.o.b. 31.25
Philadelphia, f.o.b. 31.00
Swedeland, Pa., f.o.b. 31.00
Painesville, Ohio, f.o.b. 32.00
Erie, Pa., f.o.b. 32.00
St. Paul, f.o.b. 31.25
St. Louis, f.o.b. 33.00
Birmingham, f.o.b. 30.35
Milwaukee, f.o.b. 32.00
Neville Is., Pa. 30.75

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1959 season. Freight changes for seller's account.

Gross Ton

Openhearth lump $12.70
Old range, bessemer 11.85
Old range, nonbessemer 11.70
Mesabi, bessemer 11.60
Mesabi, nonbessemer 11.45
High phosphorus 11.45

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Cold-Reduced (Coiled or Cut Length) Fully Processed
Field	.....	9.875	.....
Armature	11.70	11.20	11.70
Elect.	12.40	11.90	12.40
Special Motor	.....	12.475	.....
Motor	13.55	13.05	13.55
Dynamo	14.65	14.15	14.65
Trans. 72	15.70	15.20	15.70
Trans. 65	16.30	Grain Oriented	
Trans. 58	16.80	Trans. 80	19.70
Trans. 52	17.85	Trans. 73	20.20
		Trans. 66	20.70

Producing points: Aliquippa (*J3*); Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I5*); Mansfield (*E2*); Newport, Ky. (*A9*); Niles, O. (*S1*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville, Butler (*A7*).

ELECTRODES

Cents per lb. f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE Diam. (In.)	GRAPHITE Length (In.)	GRAPHITE Price	CARBON* Diam. (In.)	CARBON* Length (In.)	CARBON* Price
24	84	27.25	40	100, 110	12.50
20	72	26.50	35	110	11.20
18	72	27.50	30	110	11.70
14	72	27.25	24	72	11.95
12	72	28.25	20	90	11.55
10	60	29.50	17	72	12.10
10	48	30.00	14	72	12.55
7	60	29.75	10	60	13.80
6	60	33.25	8	60	14.25
4	40	37.00			
3	40	39.25			
2½	30	41.50			
2	24	64.00			

* Prices shown cover carbon nipples.

REFRACTORIES

Fire Clay Brick

Carloads per 1000

Super duty, Mo., Pa., Md., Ky.... $185.00
High duty (except Salina, Pa., add $5.00) 140.00
Medium duty 125.00
Low duty (except Salina, Pa., add $2.00) 103.00
Ground fire clay, net ton, bulk... 22.50

Silica Brick

Mt. Union, Pa., Ensley, Ala. $158.00
Childs, Hays, Latrobe, Pa. 163.00
Chicago District 168.00
Western Utah 183.00
California 165.00
Super Duty
Hays, Pa., Athens, Tex., Windham, Warren, O., Morrisville 163.00-168.00
Silica cement, net ton, bulk, Latrobe 29.75
Silica cement, net ton, bulk, Chicago 26.75
Silica cement, net ton, bulk, Ensley, Ala. 27.75
Silica cement, net ton, bulk, Mt. Union 25.75
Silica cement, net ton, bulk, Utah and Calif. 39.00

Chrome Brick

Per net ton

Standard chemically bonded, Balt.$109.00
Standard chemically bonded, Curtiner, Calif. 119.00
Burned, Balt. 103.00

Magnesite Brick

Standard, Baltimore $140.00
Chemically bonded, Baltimore 119.00

Grain Magnesite

St. ⅝ to ½-in. grains

Domestic, f.o.b. Baltimore in bulk. $73.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev.
in bulk 46.00
in sacks 52.00-54.00

Dead Burned Dolomite

Per net ton

F.o.b. bulk, producing points in:
Pa., W. Va., Ohio $16.75
Missouri Valley 15.60
Midwest 17.00

(Effective Mar. 29, 1960)

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard Q Coated Nails Col	Woven Wire Fence Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R5*	173	187	...	212	193	9.00	9.55
Aliquippa *J3***	173	190	...	...	190	9.00	9.675
Atlanta *A8***	175	192	...	214	198	8.75	9.425
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*	.....	.....	.....	.....	.....	9.00	9.55*
Chicago *N4***	173	191	177	212	197	9.00	9.75
Chicago *R5*	.....	.....	.....	.....	.....	9.00	9.55
Cleveland *A6*	.....	.....	.....	.....	.....	.....	.....
Cleveland *A5*	.....	.....	.....	.....	.....	9.00	.....
Crawf'dsv. *M4***	175	193	...	214	199	9.10	9.85
Donora, Pa. *A5*	173	187	...	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	...	212	193	9.00	9.55
Galveston *D4*	9.10‡	.....	.....	.....	.....	.....	.....
Houston *S2*	178	192	...	217	198	9.25	9.80†
Jacksonville *M4*	184-1	197	...	219	203	9.10	9.775
Johnstown *B5***	173	190	177	...	196	9.00	9.675
Joliet, Ill. *A5*	173	187	...	212	193	9.00	9.55
Kokomo *C9**	175	189	...	214	195*	9.10	9.65*
L. Angeles *B2****	.....	.....	.....	.....	.....	9.95	10.625
Kansas City *S2**	178	192	...	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass. *W6*	.....	.....	.....	.....	.....	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	...	...	213	9.95	10.50
Rankin, Pa. *A5*	173	187	...	...	193	9.00	9.55
So. Chicago *R5*	173	187	...	...	193	8.65	9.20
S. San Fran. *C6*	....	.....	...	236	.....	9.95	10.50†
SparrowsPt. *B5***	175	.....	...	214	198	9.10	9.775
Struthers, O. *Y1**	.....	.....	.....	.....	.....	8.65	9.20
Worcester *A5*	179	.....	.....	.....	.....	9.30	9.85
Williamsport *S5*	.....	.....	.....	.....	.....	.....	.....

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only.

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26-0.40	0.41-0.60	0.61-0.80	0.81-1.05	1.06-1.35
Anderson, Ind. *G4*	8.95	10.40	12.60	15.60	18.55
Baltimore, Md. *T8*	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. *W12*	.....	10.70	12.90	16.10	19.30
Boston *T8*	9.50	10.70	12.90	15.90	18.85
Buffalo, N. Y. *R7*	8.95	10.40	12.60	15.60	18.55
Carnegie, Pa. *S9*	8.95	10.40	12.60	15.60	18.55
Chicago	..	..	..	15.60	.....
Cleveland *A5*	8.95	10.40	12.60	15.60	18.55
Dearborn *S1*	9.05	10.50	12.70	.....	.....
Detroit *D1*	9.05	10.50	12.70	15.70	.....
Detroit *D2*	9.05	10.50	12.70	.....	.....
Dover, O. *G4*	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. *M8*	9.05	10.40	12.60	.....	.....
Franklin Park, Ill. *T8*	9.05	10.40	12.60	15.60	18.55
Harrison, N. J. *C11*	.....	.....	12.90	16.10	19.30
Indianapolis *R5*	9.10	10.55	12.60	15.60	18.55
Los Angeles *C1*	11.15	12.60	14.80	17.80	.....
New Britain, Conn. *S7.a*	9.40	10.70	12.90	15.90	18.85
New Castle, Pa. *B4*	8.95	10.40	12.60	15.60	.....
New Haven, Conn. *D1*	9.40	10.70	12.90	15.90	.....
Pawtucket, R. I. *N7*	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. *A1*	9.05	10.40	12.60	15.60	18.55
Sharon, Pa. *S1*	8.95	10.40	12.60	15.60	18.55
Trenton, *R4*	.....	10.70	12.90	16.10	19.30
Wallingford *W1*	9.40	10.70	12.90	15.90	18.55
Warren, Ohio *T4*	8.95	10.40	12.60	15.60	18.75
Worcester, Mass. *A5*	9.50	10.70	12.90	15.90	18.85
Youngstown *R5*	9.10	10.55	12.60	15.60	18.55

BOILER TUBES

$ per 100 ft. carload lots cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	Size B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
Babcock & Wilcox	2	13	40.28	47.21	35.74
	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
National Tube	2	13	40.28	47.21	35.74
	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
Pittsburgh Steel	2	13	40.28	47.21	.....
	2½	12	54.23	63.57	.....
	3	12	62.62	73.40	.....
	3½	11	73.11	85.70	.....
	4	10	97.08	113.80	.....

METAL POWDERS

Cents per lb, minimum truckload, delivered E. of Miss. River, unless otherwise noted.

Iron Powders

Compacting Powders

Electrolytic, imported, f.o.b.	29.50 to 33.00
Electrolytic, domestic	34.50
Sponge	11.50
Atomized	11.25
Hydrogen Reduced	11.25 to 12.00
Carbonyl	88.00
Welding Powders*	8.10
Cutting and Scarfing Powders*	9.10

Copper Powders

Molding Grades

Electrolytic, domestic f.o.b. shipping point	48.00
Precipitated	47.50
Atomized	39.80 to 48.30
Hydrogen reduced, f.o.b.	49.25
Bronze	47.20 to 51.50
Chromium, electrolytic	$5.00
Lead	19.00
Manganese, f.o.b.	42.00
Molybdenum	$3.60 to $3.95
Nickel	$1.05 to $1.03
Nickel Silver	53.50
Nickel Steel	13.00
Solder	13¢ plus metal value
Stainless Steel, 302	$1.07
Stainless Steel, 316	$1.26
Steel, atomized, prealloyed, 4600 series	14.00 plus metal value
Tin	14¢ plus metal value
Titanium, 99.25+%, per lb., f.o.b.	$11.25
Tungsten	$3.15 (nominal)

* F.O.B., shipping point.

FASTENERS

(Base discount, f.o.b. mill, pct discounts)

BOLTS, NUTS, CAP SCREWS

(List of October 1959)

1 container	50 pct
20,000 lbs	58 pct

Note—Add 25 pct for less than container quantity. Add 7½ pct for Nuts assembled to Bolts.

RIVETS

	Base per 100 lbs
½ in. and larger	$12.85
	Pct. Off List
7/16 in. and smaller	15

MACHINE SCREWS BULK

Flat, Round, Oval	50 pct
Fillister	46 pct

MACHINE SCREW NUTS

Sq	60 pct
Hex	56 pct

BULK MINIMUMS — Machine Screws and Machine Screw Nuts

¼ diam and smaller	25,000 pcs
5/16 diam and larger	15,000 pcs
#10 diam and larger over 3" long and nuts for long Screws	5,000 pcs

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper

Rolled elliptical, 18 in. or longer, 5000 lb lots	48.00
Electrodeposited	40.00
Brass, 80-20, ball anodes, 2000 lb or more	53.00
Zinc, ball anodes, 2000 lb lots	19.75
(for elliptical add 1¢ per lb)	
Nickel, 99 pct plus, rolled carton, 5000 lb	1.0225
(Rolled depolarized add 3¢ per lb)	
Cadmium, 5000 lb	1.30

Tin, ball anodes $1.05 per lb (approx.).

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	65.90
Copper sulphate, 100 lb bags, per cwt.	27.75
Nickel salts, single, 100 lb bags	36.00
Nickel chloride, freight allowed, 100 lb	45.00
Sodium cyanide, domestic, f.o.b. N. Y., 200 lb drums	23.70
(Philadelphia price 25.00)	
Zinc cyanide, 100 lb	60.75
Potassium cyanide, 100 lb drum N. Y.	45.50
Chromic acid, flake type, 10,000 lb or more	30.44

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.5
Chicago	139.8
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

STEEL SERVICE CENTERS

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery‡ Charge*	Sheets			Strip	Plates	Shapes	Bars		Alloy Bars			
		Hot-Rolled (18 ga. & hvr.)	Cold-Rolled (15 gage)	Galvanized (10 gage)††	Hot-Rolled		Standard Structural	Hot-Rolled (merchant)	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		8.59	9.87	10.13	8.91	9.29	9.40	9.39	13.24	.....	.....	.....	.....
Baltimore**	.10	8.63	10.10	10.16	11.04	9.25	10.02	9.43	11.90	17.48	16.48	21.58	20.83
Birmingham**		9.43	10.20	10.46	10.41	9.29	9.50	9.09	13.14	16.76	.....	.....	.....
Boston**	.10	9.73	10.50	11.87	11.70	9.81	10.62	10.01	13.45	17.69	16.69	21.79	21.04
Buffalo**	.15	8.95	10.10	11.30	10.80	9.15	9.80	9.15	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	8.89	10.35	11.10	10.55	8.82	9.48	8.99	10.80	17.10	16.10	19.70	20.45
Cincinnati**	.15	9.06	10.41	11.10	10.87	9.20	10.04	9.31	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	8.88[1]	10.03	11.29	10.66	9.07	9.90	9.11	11.40	17.21	16.21	21.31	20.56
Denver	.20	9.60	11.84	12.94	9.63	9.96	10.04	10.00	11.19	.....	.....	.....	20.84
Detroit**	.15	9.15	10.61	11.45	10.92	9.19	10.04	9.30	11.16	17.38	16.38	21.48	20.73
Houston**		9.67	10.41	12.193	11.28	9.47	9.34	9.13	13.10	17.50	16.55	21.55	20.85
Kansas City**	.15	9.36	11.02	11.50	11.02	9.25	9.95	9.46	11.72	17.17	15.87	21.87	21.12
Los Angeles**		9.95[1]	11.55	12.20	11.55	10.00	10.00	9.75	14.20	18.30	17.35	22.90	22.20
Memphis	.15	8.55	9.80	.....	8.60	8.93	9.01	8.97	12.11	.....	.....	.....	.....
Milwaukee**	.15	9.03	10.49	11.24	10.69	8.96	9.70	9.13	11.04	17.24	16.24	21.24	20.49
New York	.10	9.46	10.23	11.45	11.56	9.61	10.30	9.84	13.35	16.16	16.50	20.10	20.85
Norfolk	.20	8.20	.....	.....	8.90	8.65	9.20	8.90	10.70	.....	.....	.....	.....
Philadelphia	.10	9.20	10.10	10.99	11.20	9.65	9.95	9.60	12.05	16.58	16.48	20.08	20.03
Pittsburgh**	.15	8.88	10.03	11.18	10.64	8.83	9.51	9.00	11.40	17.10	16.10	19.70	20.45
Portland		10.00	11.75	13.30	11.95	11.50	11.10	9.85	15.30	18.50	17.45	20.75	20.25
San Francisco**	.10	11.00	11.95[2]	11.65	12.25	11.00	10.95	10.75	15.20	18.30	17.35	22.90	22.20
Seattle**		11.55	12.30	12.50	12.65	11.00	10.20	11.10	16.20	18.60	17.80	22.70	22.20
Spokane**	.15	11.70	12.45	12.65	13.30	11.15	11.35	11.75	16.35	17.75	17.95	21.58	22.35
St. Louis**	.15	8.69	10.73	11.48	10.65	8.93	9.60	9.10	11.43	17.48	16.48	21.58	20.83
St. Paul**	.15	9.19	9.74	10.89	10.81	9.10	9.78	9.27	11.64	.....	16.69	.....	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. ** These cities are on net pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—⅛" x 1"; Plate—¼" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—⅞-2 15/16; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅛" to 2⅞"; cold drawn—15/16" to 2⅞" round; Hot-rolled 4140—⅞" to 2⅞" round, cold drawn—15/16" to 2⅞" round.

†† 13¢ zinc. ‡ Deduct for country delivery. [1] 15 ga. & heavier; [2] 14 ga. & lighter. [3] 10 ga. x 48 — 120.

(Effective Mar. 29, 1960)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	.....	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	67.00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	68.00	68.50	69.00	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	.....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Everett *M6*	67.50	68.00	68.50	.....	.....
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	.....
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Sharpsville *S3*	66.00	.....	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
So. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	73.00†
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	.....	.....	66.50	.....	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Add $1.00 for 0.31-0.69 pct phos.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1, I4*, (Globe Div.), $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75¢ per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 13 pct. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

* Intermediate low phos.

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	28.00	31.50	29.00	32.75	33.25	34.50	51.25	41.50	48.25	—	22.25	—	22.50
Billets, forging	—	37.75	38.75	39.50	42.50	42.00	64.50	48.75	57.75	29.25	29.25	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	49.50	75.75	57.50	67.25	35.00	35.00	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25 31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	55.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	44.25	69.25	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	56.75	55.00	80.75	65.50	79.25	40.25	40.25	42.50	40.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	47.00	71.75	54.50	63.75	33.25	33.25	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown. *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7,* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13,* (25¢ per lb. higher); New Bedford, Mass., *R6* Gary, *U1,* (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forging billets: Ambridge, Pa., *B7;* Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa., *C2.*

(Effective Mar. 29, 1960)

An important message for the man who buys
STEEL WIRE RODS
Any manufacturer of nail, wire mesh or barbed wire looks first for quality in steel wire rods. For rods that are uniform in size and of the specified tensile strength, mill owners have learned to rely on Sumitomo's wire rods, made in accordance with strictest standards. To keep up with this export demand, Sumitomo Metal has added to its present facilities another new wire rod mill, completely equipped with the most modern machinery available.
LEADING PRODUCERS OF STEEL WIRE RODS, PIPE AND ROLLING STOCK PARTS
SUMITOMO METAL INDUSTRIES, LTD.
HEAD OFFICE: OSAKA, JAPAN
CABLE ADDRESS: "SUMITOMOMETAL OSAKA"

Ferrochrome

Cents per lb contained Cr, lump, bulk, carloads, del'd. 67-71% Cr, .30-1.00% max. Si.

0.02% C	41.00	0.50% C	32.75
0.05% C	33.50	1.00% C	32.50
0.10% C	33.25	1.50% C	32.25
0.20% C	33.00	2.00% C	32.00

4.00-4.50% C, 60-70% Cr, 1-2% Si. 28.75
3.50-5.00% C, 57-64% Cr, 2.00-4.50% Si 28.25
0.025% C (Simplex) 31.50
5-7% C, 61-65% Cr, 5-8% Si 22.00
5% max C, 50-55% Cr, 2% max Si.. 25.00

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max. 0.10% C price schedule.

Chromium Metal

Per lb chromium, contained, packed, delivered, ton lots, 97.25% min. Cr, 1% max. Fe.
0.10% max. C $1.29
9 to 11% C, 88-91% Cr, 0.75% Fe... 1.38

Electrolytic Chromium Metal

Per lb of metal 2" x D plate (⅛" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.
Carloads $1.15
Ton lots 1.17
Less ton lots 1.19

Low Carbon Ferrochrome Silicon

(Cr 39-41%, Si 42-45%, C 0.05% max.)
Carloads, delivered, lump, 3-in. x down, packed.
Price is sum of contained Cr and contained Si.

	Cr	Si
Carloads, bulk	24.50	14.60
Ton lots	29.75	16.05
Less ton lots	31.35	17.70

Calcium-Silicon

Per lb of alloy, lump, delivered, packed.
30-33% Cr, 60-65% Si, 3.00 max. Fe.
Carloads, bulk 24.00
Ton lots 27.95
Less ton lots 29.45

Calcium-Manganese—Silicon

Cents per lb of alloy, lump, delivered, packed.
16-20% Ca, 14-18% Mn, 53-59% Si.
Carloads, bulk 23.00
Ton lots 26.15
Less ton lots 27.15

SMZ

Cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.
Ton lots 21.15
Less ton lots 22.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5: 38-42% Cr, 17-19% Si, 8-11% Mn, packed.
Carload lots 18.45
Ton lots 19.95
Less ton lots 21.20

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.
Carload bulk 19.20
Ton lots to carload packed 21.15
Less ton lots 22.40

Ferromanganese

Maximum base price, f.o.b., lump size, base content 74 to 76 pct Mn. Carload lots, bulk.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	11.00
Johnstown, Pa.	11.00
Lynchburg, Va.	11.00
Neville Island, Pa.	11.00
Sheridan, Pa.	11.00
Philo, Ohio	11.00
S. Duquesne	11.00

Add or substract 0.1¢ for each 1 pct Mn above or below base content.
Briquets, delivered, 66 pct Mn:
Carloads, bulk 13.70
Ton lots packed in bags 16.10

Spiegeleisen

Per gross ton, lump, f.o.b., 3% Si max.

Mn	Palmerton, Pa. 10 lb, pig	35 lb, down	Neville Is., Pa. 35 lb
16-19%	$98.00	$96.00	$100.50
19-21%	100.00	98.00	102.50
21-23%	102.50	100.50	105.50

Manganese Metal

2 in. x down, cents per pound of metal delivered.
95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.
Carload, packed 45.75
Ton lots 47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.
Carloads, bulk 34.25
Ton lots, palletized 36.25
250 to 1999 lb 39.00
Premium for Hydrogen - removed metal 0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max., carloads, lump, bulk, delivered, per lb of contained Mn 24.00

Low-Carb Ferromanganese

Cents per pound Mn contained, lump size, packed, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% (Bulk) P, 90% Mn	37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C.	31.10	33.90	35.10
0.30% max. C	29.80	32.60	33.80
0.50% max. C	28.50	31.30	32.50
0.75% max. C, 80.85% Mn, 5.0-7.0% Si	27.00	29.80	31.00

Silicomanganese

Lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.3¢ f.o.b. shipping point.
Carloads bulk 11.60
Ton lots, packed 13.25
Carloads, bulk, delivered, per lb of briquet 14.00
Briquets, packed pallets, 2000 lb up to carloads 16.40

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct., f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $106.50 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Cents per pound contained Si, lump size, delivered, packed.

	Ton lots,	Carloads,
98.25% Si, 0.50% Fe	22.95	21.65
98% Si, 1.0% Fe	21.95	20.65

Silicon Briquets

Cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.
Carloads, bulk 8.00
Ton lots, packed 10.80

Electric Ferrosilicon

Cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si	14.60	75% Si	16.90
65% Si	15.75	85% Si	18.60
	90% Si	20.60	

Ferrovanadium

50-55% V delivered, per pound, contained V, in any quantity.
Openhearth 3.20
Crucible 3.30
High speed steel 3.40

Calcium Metal

Eastern zone, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
100 to 1999 lb.	2.40	3.30	4.55

(Effective Mar. 29, 1960)

Alsifer, 20% Al, 40% Si, 40% Fe, f.o.b. Suspension Bridge, N. Y., per lb.
Carloads, bulk ..... 9.85¢
Ton lots ..... 11.20¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo $1.50

Ferrocolumbium, 58-62% Cb, 2 in. x D, delivered per pound
Ton lots $3.45
Less ton lots 3.50

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, del'd ton lots, 2-in. x D per lb con't Cb plus Ta $3.40

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo.. $1.76

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $5.00 unitage, per gross ton $120.00
10 tons to less carload $131.00

Ferrotitanium, 40% regular grade 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots, per lb contained Ti $1.35

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots, per lb contained Ti $1.50
Less ton lots $1.54

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton $255.00

Ferrotungsten, ¼ x down packed, per pounds contained W, ton lots delivered ..... $2.15 (nominal)

Molybdic oxide, briquets per lb contained Mo, f.o.b. Langeloth, Pa. $1.49
bags, f.o.b. Washington, Pa., Langeloth, Pa. $1.38

Simanal, 20% Si, 20% Mn, 20% Al, f.o.b. Philo, Ohio, freight allowed per lb.
Carload, bulk lump ..... 18.50¢
Ton lots, packed lump ..... 20.50¢
Less ton lots ..... 21.00¢

Vanadium oxide, 86-89% V_2O_5 per pound contained V_2O_5 .... $1.38

Zirconium silicon, per lb of alloy 35-40% del'd, carloads, bulk.. 26.25¢
12-15%, del'd lump, bulk-carloads ..... 9.25¢

Boron Agents

Borosil, per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B
2000 lb carload $5.50

Ferro Zirconium Boron, Zr 50% to 60%, B 0.8% to 1.0%, Si 8% max., C 8% max., Fe balance, f.o.b. Niagara Falls, New York, freight allowed, in any quantity per pound ..... 30¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5%, f.o.b., Suspension Bridge, N. Y., freight allowed.
Ton lots per pound ..... 18.25¢

Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots.. $1.20
F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up
10 to 14% B ..... .85
14 to 19% 1.20
19% min. B 1.50

Grainal, f.o.b. Cambridge, O., freight, allowed, 100 lb and over
No. 1 ..... $1.05
No. 79 ..... 50¢

Manganese-Boron, 75.00% Mn, 17.50% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.
Ton lots (packed) $1.46
Less ton lots (packed) 1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots 2.15

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Electric Power Equipment — A. C. Motors

3 phase—60 cycle

SLIP RING

Qu.	H.P.	Make	Type	Volts	Speed
1	1750	G.E.	M-579BS	4800	1800
1	1500	G.E.	MT	6600	1187
1	800	Whse.	CW	550	1776
1	800	G.E.	MT-428	2200	450
1	600	Whse.	CW	220/440	900
1	600	Whse.	CW-4-32D-15	440	1778
1	550	Whse.	CW	440	252
1	500	Whse.	CW	550	350
1	300	A.C.	ANY	440/2300	720
1	300	G.E.	MTP561	2200	1800
1	250	G.E.	IM-16	220/440	875
1	250	A.C.	ANY	550	600
1	250	Cr. Wh.	Size 29Q	2300	350
1	250	G.E.	MT-423Y	4000	257
1	200	G.E.	IE-13B	220	1800
2	200	Whse.	CW-890	2300	1775
2	200	G.E.	IM-17A	2200	435
1	200	G.E.	IM	2200	580
1	125	G.E.	MT-557	220/440	1200
2	100	A.C.		440	695

SQUIRREL CAGE

1	500	G.E.	FT-559AY	2200	3600
2	500	Whse.	CSP-583H	440	3600
1	500	Whse.	CS-1115	2200	863/445
4	500	Whse.	CS-1216	2200	900
2	450	Ell.	F-2910	2200	1200
1	400	Whse.	CS-7151-610H	6600/4000	3585
1	300	Whse.	CS-1002	2300/440	600
1	250	Whse.	CS-875S	2200	1775
1	200	Whse.	CSP-581S	440	3450
2	200	Whse.	CS-855S D.P.	220/440	1750
1	200	Whse.	CS-873C	2200	1160
1	150	G.E.	FT-558	2200	875
1	150	Whse.	CS	440	580
1	125	Whse.	CS-764C	220/440	1160
3	100	Whse.	CS-760C	2200/440	1160
1	100	Whse.	B.B.CS-607	220/440	1780

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1	6000	G.E.	ATI .8	2200/6600	600
1	3500	G.E.	TS 1.0	4600/2300/4000	360
1	2000	G.E.	ATI	2300	900
2	1750	G.E.	ATI	2300	3600
1	1750	G.E.	TS	2300/4600	900
1	700	G.E.	TS .8P.F.	2300	1200
1	400	G.E.	TS-7563S	2200	1200
2	350	G.E.	ATI 1.0P.F.	2300	150
1	325	G.E.	ATI 1.0P.F.	110	1800
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(1) 1000-KW. 3-unit M.G. set (2) 500-K.W. 600-V.D.C. Generators, & 1500-H.P. Syn. Motor, 2300-V., 3 ph., 60 cy. & starting equip's.

(2) 300-H.P. Whse. Motors, 230-V.D.C. 300/600 R.P.M. with

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QU.	H.P.	MAKE	VOLTS	R.P.M.
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1*	2550	Whse.	700	108/162
1*	2200	Whse.	600	92/132
1*	2000	G.E.	600	200/400
1*	2000	G.E.	350	230/350
1*	1750	G.E.	600	200/300
1*	750	Whse.	250	200/400
4*	700	Whse.	250	300/700
2*	645	S & S	300	1000
1	600	Whse.	250	110/220
2	235	Whse.	230	325/975
1	150	Whse.	230	400/1200
3	125	Whse.	230	350/1050
1	125	Whse.	230	450/900
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Detroit Dealers Say Business Is Up

Used machine sales in the Detroit area are higher than in the first quarter of 1959.

Right now, most dealers are building inventories for the expected good spring business.

■ Like new car sales, Detroit's used machinery business is as good or better than a year ago. But unlike the auto industry, which had hoped for even better things, there are no screams of disappointment from machinery dealers.

"I think many of us looked for a fair rise in the first quarter over a year ago and are getting it," says a Motor City dealer. Many dealers in the area agree.

Up Again — A cross section of opinion indicates January sales were higher than last year. February ranged from poor to fair. March, again, is showing improvement.

What bruised the market in February, say some dealers, were talks of automotive production cutbacks in the spring. One dealer speculates that the rise in Big Three compact car production is affecting business. "Fewer machines are needed to turn out the fewer and smaller parts on the new compacts," he says, "especially the little 6-cyl engines. I hear smaller compacts with 4-cyl engines are on the way. This could make things even worse." But this is not a widespread opinion.

The Months Ahead—How about the next few months? "We've got high hopes," reports a specialist in production equipment. "We're looking for quite a bit more activity in the second quarter. "We've had plenty of lookers in recent weeks, people wandering in and out of our place. Quite a few say they're intent on buying this spring."

He says his company has been tuning up for an increase by getting its inventory in shape the past several weeks. Spots in the inventory are being filled. The work force is busy getting machines in topnotch condition for the spring selling session. Aim is to have a big variety of equipment ready and waiting for rapid delivery when the time comes.

No Complaint—A smaller operator agrees this is good business. But he can't afford the luxury of a big inventory. "We've missed out on a sale or two lately," he says, "because we couldn't come up with the right machine at the right time. But we can't complain. We've already sold a couple lathes, milling machines, drill presses and a shaper or two this month." He says this has helped him match his income of March last year, when he had fewer sales, but made a lucrative sale of a big boring mill.

Prices this year aren't too different from a year ago. Good machines continue to bring a good price. Recent auctions have shown that the prices are standing up well. Auction activity has been off a bit from 1959, however. There were quite a few in January, very few in February. Now they seem to be picking up again.

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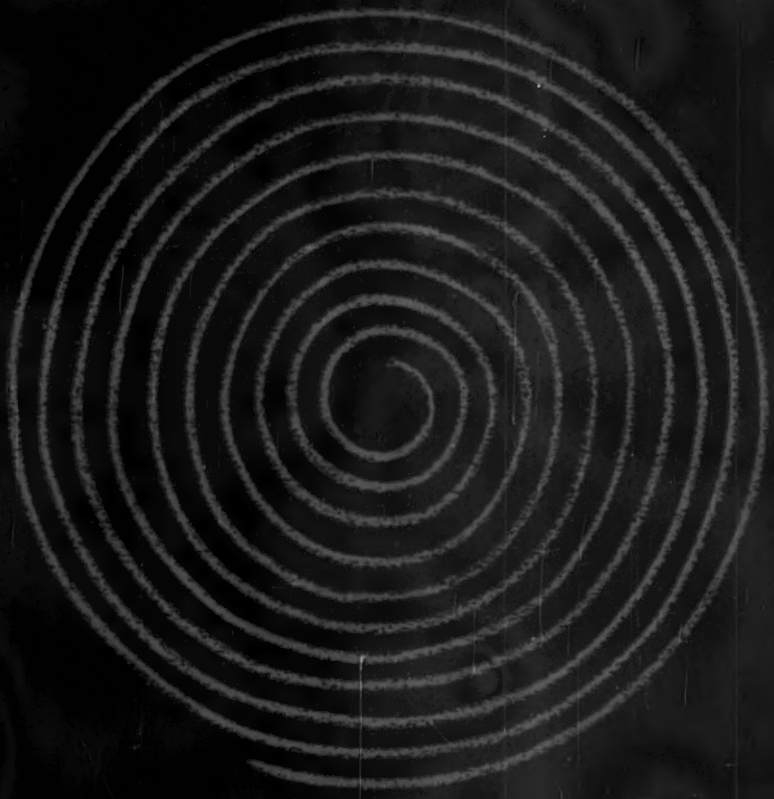

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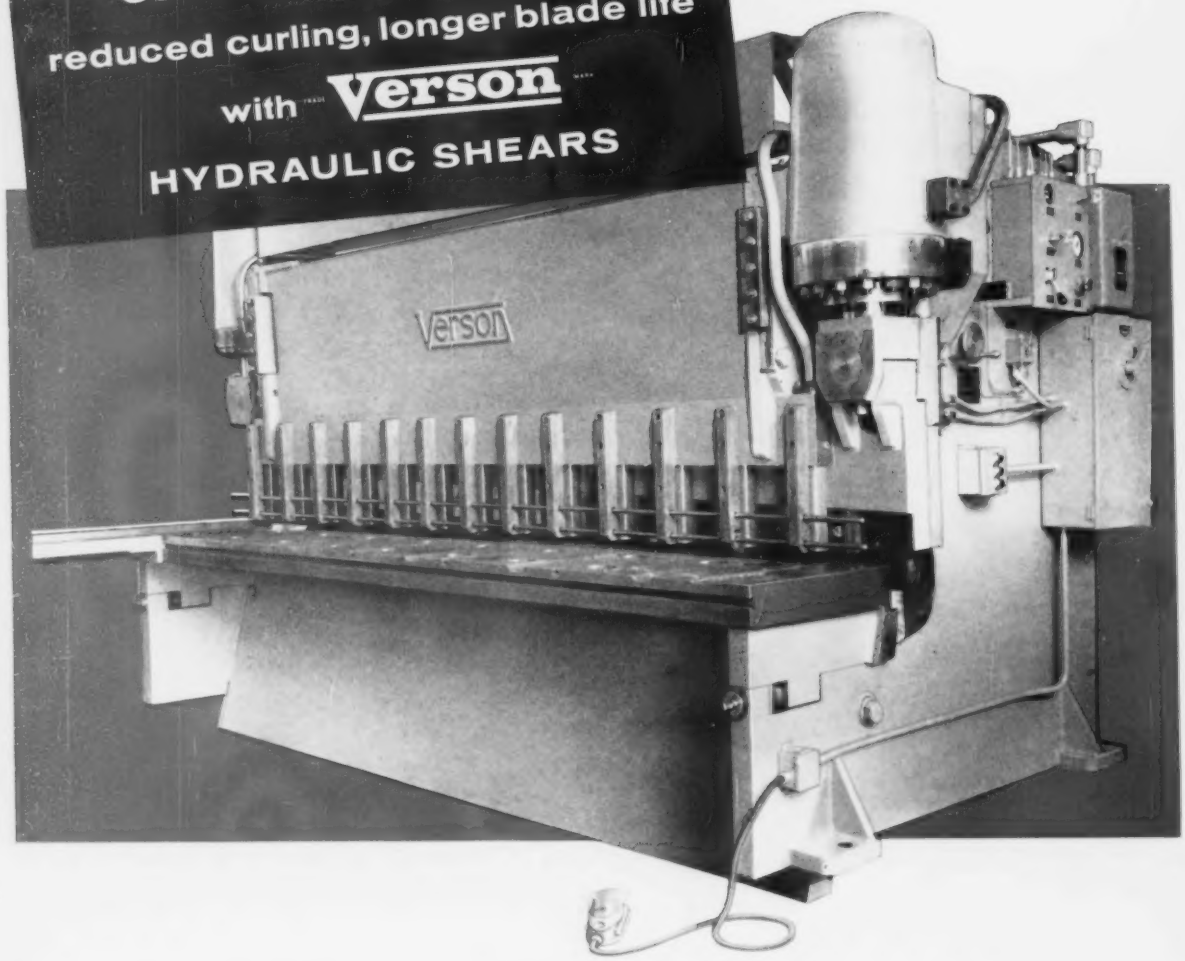

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